DOCUMENT RESUME

ED 159 785 95 EA 010 879

AUTHOR Matthews, Kenneth M.
TITLE A Study of the Impact of Resource Cost Variations on Equality of Educational Opportunity in Georgia.
INSTITUTION Georgia State Board of Education, Atlanta.
SPONS AGENCY Office of Education (DHEW), Washington, D.C.
PUB DATE 78
NOTE 126p.

EDRS PRICE MF-$0.83 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS Bibliographies; Cost Indexes; Costs; Educational Finance; Educational Research; Elementary Secondary Education; *Equal Education; *Equalization Aid; Graphs; Literature Reviews; *Resource Allocations; *Statistical Studies; Tables (Data)
IDENTIFIERS Georgia

ABSTRACT

Georgia's equalization aid program, intended to meet the varying needs of pupils around the state, does not take into account variations in resource costs between districts. This study, introduced by a review of previous research on the topic, was designed to analyze the impact of these variations in resource costs on equality of educational opportunity. The study process first measured the relative educational needs of pupils in a sample of school districts. The second step focused on differences in expenditures of these districts for resources of equivalent quality. Finally these two measures were integrated to provide indices of relative financial needs that could be compared to actual equalization aid levels received by the districts. The study revealed relatively little effect on equality of educational opportunity, despite measurable differences in costs. Eighty percent of these differences were related to beginning teacher salary rates. If the figures gathered from the sample districts adequately represent the entire state's variations in resource costs, the measure of the Georgia aid program's equity is lowered from approximately 97 percent to 94 percent, a drop of only 3 percent. Numerous graphs and tables display the data gathered in each of the budget categories sampled. (Author/PGD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

A STUDY OF THE IMPACT OF RESOURCE COST VARIATIONS ON EQUALITY OF EDUCATIONAL OPPORTUNITY IN GEORGIA

ED159785

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Kenneth M. Matthews
Principal Investigator

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

Dayne M. Smith

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

EA 010 879

1978
Georgia School Finance Study
Athens, Georgia 30602

GEORGIA SCHOOL FINANCE STUDY

Doyne M. Smith, Project Director
Carvin L. Brown, Senior Research Consultant
Michael W. La Morte, Senior Research Consultant
Carroll W. McGuffey, Sr., Senior Research Consultant
Kenneth M. Matthews, Senior Research Consultant
Jeffrey D. Williams, Director of Research

Research Staff

Tak Cheung Chan
David L. Grayson
Robert B. Meadows
Glenn E. Pethel
John R. Taylor

Program Administrators

Charles McDaniel
State Superintendent of Schools

S. Cal Adamson
Associate State Superintendent of Schools

Ronald Luckie
Director, Planning, Research and Evaluation Division

U.S. Office of Education

Thomas Johns
Anne Just
Dexter Magers
Esther Tron

ADVISORY COMMITTEE

Honorable Nathan Knight (Chairman)
Member, Georgia House of Representatives

Dr. S. Cal Adamson
Georgia Department of Education

Honorable Paul C. Broun
Member, Georgia State Senate

Honorable Hugh A. Carter
Member, Georgia State Senate

Mr. Tom Faircloth
Georgia Municipal Association

Honorable Joe Frank Harris
Member, Georgia House of Representatives

Mrs. Nellie Hoenes
Office of Planning and Budget

Mr. Otis Jackson
Georgia School Boards Association

Mr. Kermit Keenum
Georgia Association of School Superintendents

Dr. Barbara Nicholson
Professional Association of Georgia Educators, Inc.

Mr. Jay S. Ricketts
Association County Commissioners of Georgia

Mrs. Lithangia Robinson
Georgia Association of Educators

Honorable Ben B. Ross
Member, Georgia State Senate

Ms. Dorothy J. Tracy
League of Women Voters of Georgia

Honorable Tom Vann
Member, State Board of Education

Mrs. Ann Weeks
Georgia Congress of Parents and Teachers

Financed by Funds Provided to the Georgia Board of Education Under Section 842(a)(1) of Public Law 93-380, Educational Amendments of 1974.

PREFACE

The cost of education has been the focus of many studies with the ultimate goal of modifying funding practices. Contemporary research is directed toward finding ways of amending state plans to compensate for differences in the cost of delivering equivalent educational programs. Missing in these efforts is an analysis of the effects of differences in the cost of educational resources on the educational opportunities available to pupils under state financial support plans. An investigation of the impact of resource cost variations on programs to meet the educational needs of pupils under the Adequate Program for Education in Georgia is the focus of the study reported in this document.

Studies of the cost of education have used many different measures of cost. Some have used differences in the cost of living as proxies for differences in the cost of education. Others have measured changes in the average expenditures of educational agencies to determine changes in the cost of education. In this study, expenditures of local school districts for specific educational resources were used to arrive at measures of differences in the cost of education among a sample of school districts in Georgia.

Definitions of the educational needs of pupils cannot be generated without being subject to emotional debate as all definitions of need are laden with bias. Rather than attempt to generate new definitions of educational needs, the practices of the state were used as a basis for measuring the educational needs of pupils. Although calculations of the amount of state funds to be disbursed to local school districts involved intermediary adjustments, eligibility for funding under each of the several sections of the state plan began with an identifiable data base. With the exception of capital outlay needs, which were identified in a special study, these data served as the measures of educational needs used to arrive at an estimate of the extent state funds were disbursed in direct relation to the educational needs of pupils.

Considerable differences were found in expenditures for educational resources among the districts included in this study. However, these differences had a relatively minor effect on equity under the state plan. Although no clear directions for policy are indicated, this study provides information which will be of value as the State of Georgia moves toward equal educational opportunity for all pupils.

Athens, GA
April, 1978

Kenneth M. Matthews

Acknowledgments

This report is the result of the combined efforts of many people. Special recognition is given to: the Superintendents and staffs of the sample districts for their patience and assistance in securing the appropriate data; the staff of the Georgia Department of Education for their open attitudes and efforts in obtaining data in the desired form; Carvin Brown for professional support and the many hours gathering data; Jeff Williams for providing the data necessary for analysis of the policy implications of this study; James Stultz for reviewing the literature under unreasonable time constraints; Glenn Pethel and John Taylor for the tiresome hours gathering data; Suzy Holmes for cheerful computer analysis of the data; Carroll McGuffey for a critical analysis of the research design; Robert Fowler for assisting in the preparation of specifications for the resources studied; Robert Meadows and David Grayson for assisting in the collection of special data; Gail Smith for assisting in the preparation of graphs; Janie Duceatt for typing the manuscript and preparing graphs, tables, and maps; and to T. C. Chan for many tedious hours collecting data and for the difficult job of preparing all of the original graphs.

TABLE OF CONTENTS

Page

CHAPTER ONE—THE PRICE OF EQUALIZATION OF EDUCATIONAL OPPORTUNITY, THE MISSING FACTOR by James R. Stultz 1

Assesssment and Adjustment for Variations in Costs for Equivalent Educational Resources 2

Economics of Scale and Other Related Studies 8

Cost-of-Education Index Studies 12

Summary 16

CHAPTER TWO—THE STUDY DESIGN AND PROCEDURES ..30

Operational Definitions 30

Procedures 39

CHAPTER THREE—EQUITY OF APPROPRIATIONS UNDER THE ADEQUATE PROGRAM FOR EDUCATION IN GEORGIA 46

Equity of Appropriations by APEG Section 46

APEG Appropriations Equity 61

CHAPTER FOUR—THE EFFECT OF RESOURCE COST VARIATIONS 62

Relative Resource Costs by Budget Account 62

Resource Cost Indices 92

Effect of Cost Differences 93

CHAPTER FIVE—POLICY IMPLICATIONS 94

Sources of Cost Variations 94

Situational Factors and Teacher Salary 99

Policy Directions 110

Summary 117

ILLUSTRATIONS

Figure		
2-1.	Illustrative data for three hypothetical districts, three items of expenditure, and two categories of support	32
2-2.	The schematic plan	40
2-3.	Pupil distributions	42
3-1.	32-605 Equity	47
3-2.	32-607 Equity	48
3-3.	32-609 Equity	49
3-4.	32-610 Equity	50
3-5.	32-613 Equity	51
3-6.	32-614 Equity	52
3-7.	32-615 Equity	53
3-8.	32-616 Equity	54
3-9.	32-617 Equity	55
3-10.	32-618 Equity	56
3-11.	32-620, 621 Equity	57
3-12.	32-622 Equity	58
3-13.	32-625 Equity	59
3-14.	32-648 Equity	60
3-15.	APEG appropriations equity	61
4-1.	Account 053 costs	63
4-2.	Account 054 costs	64
4-3.	Account 058 costs	65
4-4.	Account 063 costs	66
4-5.	Account 068 costs	67
4-6.	Account 069 costs	68
4-7.	Account 070 costs	69
4-8.	Account 071 costs	70
4-9.	Account 072 costs	71
4-10.	Account 074 costs	72
4-11.	Account 077 costs	73
4-12.	Account 079 costs	74
4-13.	Account 082 costs	75
4-14.	Account 085 costs	76
4-15.	Account 089 costs	77
4-16.	Account 101 costs	78
4-17.	Account 105 costs	79
4-18.	Account 110 costs	80
4-19.	Account 111 costs	81
4-20.	Account 113 costs	82
4-21.	Account 115 and 182 costs	83
4-22.	Account 117 costs	84
4-23.	Account 119 costs	85
4-24.	Account 124 costs	86
4-25.	Account 128 costs	87
4-26.	Account 130 costs	88
4-27.	Account 131 costs	89
4-28.	Account 132 costs	90
4-29.	Account 155 costs	91
4-30.	Resource cost indices	92

Map

1. Sample districts 45
2. Geography and teacher salary 101
3. Income and geography 105
4. Property wealth and geography 107
5. Population density and geography 109
6. Adult education and geography 111

Table

1. Sample districts 44
2. Resource cost correlations 95
3. Scurces of RCI variations 98
4. Analysis of teacher salary and geography 100
5. Correlation matrix of situational factors 103
6. Analysis of personal income and geography 104
7. Analysis of property wealth and geography 104
8. Analysis of population density and geography 108
9. Analysis of adult education and geography 108
10. Situational factors and teacher salary 112
11. Property wealth and income on teacher salary 114
12. Density and income on teacher salary 115
13. Adult education and income on teacher salary 116

CHAPTER ONE

THE PRICE OF EQUALIZATION OF EDUCATIONAL OPPORTUNITY, THE MISSING FACTOR

by

Dr. James R. Stultz

Florida Department of Education

Should the profession be polled to determine the most important, highest priority goal of educational finance during the decade of the 1970's, the choice would most certainly be "equalization of educational opportunity."[1] The philosophy that American elementary and secondary schools should provide equal opportunity to all youths regardless of social or economic background was succinctly stated by Cubberley in the early part of the twentieth century.[2] Even with the concentration of many resources, including many brilliant intellects, the equalization of educational opportunity concept is still evolving.

Many problems have been identified and solved since Cubberley's time, however, significant financial equalization problems remain. According to Johns, the development of an equitable school finance program involves two major steps: (1) computation of the cost of educational programs and services appropriate to the needs of each student in each school district and which are substantially equal to those provided throughout the state, and (2) the equalization among the districts of the resources available to finance the program.[3] Much of the development in providing equal educational opportunity during the past two decades has focused on the steps identified by Johns above, as these are basic to the concept. However, the question of how to insure that each pupil receives his "fair share" continues to be a significant problem.

Jordan pronounced that educational opportunity cannot be made equal merely by providing the same amount of revenue for each pupil in the districts of a state, because districts vary in the proportion of high cost pupils, in the percent of the budget that must be expended for transportation, in sparsity and density of population, in attractiveness of living conditions, in the rate of crime and in other factors affecting the cost of delivering educational services and facilities.[4] The challenge is to identify variations in the cost of delivering equivalent educational programs and services among districts irrespective of their economic conditions and to insure that all districts have equal access to adequate financial support.[5]

This review will focus on studies which have investigated differences in the costs of providing equivalent educational programs and services among school districts and actions taken by states to offset these cost differences. Studies dealing with cost differences among school districts discussed in this review include cost-of-living index (price level index), cost-of-education index, rural sparsity, economy of scale, and various other educational resource allocation studies. Classification of research dealing with educational program and service cost variations is difficult because most studies deal with more than one of the topical areas mentioned above. Therefore, various studies will be included according to the significance of the findings as related to each of the topics mentioned above.

Assessment and Adjustment for Variations in Costs for Equivalent Educational Resources

Possibly the most significant problem encountered in trying to provide educational programs meeting the various needs of pupils at the individual school level is the variations in cost of equivalent delivery systems. During the 16 year period from 1960 to 1976 expenditures for elementary and secondary schools have risen from $18 billion to $75.1 billion.[6] Even though total expenditures (in constant dollars) are expected to level off through 1981, current expenditures per pupil are projected to continue to rise.[7] These data support the need for the development of factors to insure that each pupil receives like quality (and quantity) of educational resources for a specified educational program delivery system.

The purpose of this review is to assess the development of methodology that quantifies and adjusts for differences in cost of providing comparable quality (and quantity) educational resources to local school districts. Specifically, studies are examined that measure differences in the costs (prices) of specific educational program delivery systems among local school districts. A related topic concerns actions states have taken to offset these cost differences.

The reviewer has used the classification of expenditures, function (why purchased) and object (what purchased), set forth in Handbook II Revised as his "frame-of-reference" for purposes of analyzing the various studies presented in this review.[8] The term "cost" as used in this paper refers to the total resources used to provide educational programs and services, including direct and indirect (overhead) costs; and the term "expenditure" refers to actual disbursement for specific assets as recorded in an accounting system. Another reference point used in examining the research in this area is making a determination of whether the data have been averaged on a per pupil basis or in fact represents the cost of a specific resource of like quality and quantity.

A specified, consistently applied "frame-of-reference" was necessary for purposes of reviewing studies dealing with assessing and adjusting for cost of delivering like quality (for a specified quantity) educational resources to local school districts because of the various approaches and purposes used. The experience of the reviewer has been that there is much lack of consistency in the use of accounting - both definitional and application - among researchers working in this area.

Cost-of-Living Studies

Review of this topic indicates cost-of-living studies are not only the most prevalent current studies, but also the most controversial. Basically this type of study has had a narrow focus - teacher salary (and in some cases, specific benefits). Most cost-of-living studies attempt to justify a specific salary schedule required to support a given standard-of-living for teachers (and other school district employees) by objectively quantifying the cost of a given group of goods and services using the market basket approach of the consumer price index model developed by the U. S. Department of Labor.[9]

The most significant study to date, not only because of the national attention it has received but also because the results were the first to be applied in the distribution of state puplic school funds, is the Florida Price Level Index (FPLI).[10] The Florida cost-of-living research study was completed by a group of state university economists headed by Simmons for the Florida Legislature in 1973.[11] According to Simmons, the 1972 Florida State Legislature requested and appropriated funds for the purpose of establishing an index of differences in the cost-of-living among the different counties of Florida. The legislature specified that the study include three items: (1) an index of differences in the cost-of-living among the 67 counties of Florida, (2) indications of the significance of these differences, and (3) a funding formula based on the cost-of-living differences.[12] The resulting FPLI was first employed for funding school districts (conterminous with counties) for the 1973-74 fiscal year. With only slight modifications this index continues to be used to adjust the school funds distributed to Florida school districts.[13] The FPLI is used to derive a district cost differential for each school district which is applied to the state distribution formula. The district cost differentials for fiscal year 1976-77 ranged from a low for Holmes County of 0.91696 to a high for Monroe County of 1.07408.[14]

As previously mentioned, the Florida application has received a great deal of attention from both educators and economists. Fox stated that while the intent as a policy tool appears laudable, the Florida methodology seems inappropriate for adjusting school funds for three reasons: (1)

it does not accurately measure the cost of living, (2) it focuses on the cost-of-living within districts rather than the cost-of-living of teachers, and (3) from a policy perspective, it seems to address the wrong question.[15] According to Fox, rather than actually adjusting for cost-of-living differences, the technique used in Florida seemed to be a device to channel funds into districts which contain wealthy residents.[16]

In reaction to the criticisms expressed by Fox above, Simmons replied that the first criticism was based on Fox's interpretation of the 1972 index as related to the cost of shelter which he claimed could not be held constant in terms of quality - that the FPLI measures differences in standards-of-living rather than differences in the cost-of-living. Simmons maintained the housing purchase cost measure used in 1972 was a composite including the cost of a standard house structure, finance charge, interest and principal payments; that the cost criticism was for the building and did not include the cost of the lot as Fox assumed. Simmons asserted that it is entirely possible to price a standard house in different locations without differences in quality entering into the consideration. Simmons added that as of 1975 the FPLI incorporates land and the influence of location on land prices.[17]

In response to Fox's second criticism that the FPLI is relevant only to the extent that employees live and shop in the district where they work, Simmons claimed the statement was invalid because the purpose of the FPLI, as used in educational funding, is to provide a means to equalize the purchasing power of the funded money among the counties. He further stated the FPLI was not intended to compensate individual teachers for their separate and different standards-of-living based on their individual choice of what and where to purchase and where to live.[18] Simmons concluded his rebuttal by stating Fox was correct in pointing out that from a policy perspective, implementation of cost-of-living standards in an attempt to equalize the ability of districts to attract quality personnel would not meet this legislative intent. Simmons contended that however valid this policy focus criticism may be, it was out of place, because the FPLI has only one purpose in relation to educational financing: to provide the means for equalization of the purchasing power of state funds provided to the counties, not salaries or attractiveness.[19]

Jordan analyzed the results of several cost-of-living studies related to educational funding and concluded the question of providing equivalent educational programs and services had not been answered, i.e., recognition of the differences in the cost-of-living among school districts is only one segment of the much larger problem; namely, variations among school districts in the cost of delivering needed programs and services.[20] Jordan reported that Johns had found

the results of the Florida cost-of-living studies merely show differences in consumption standards among Florida counties resulting primarily from differences in average family income, specifically, the FPLI had a Pearson correlation coefficient of .86 with average family income. And thus, would indicate 74 percent of the variation was associated with or explained by variations in mean family income among the Florida counties.[21]

Jordan reported that an alternative approach to the cost-of-living problem has been recommended by the Education Review Committee in Ohio. This adjustment is reported to differ from both the Florida pattern and the Bureau of Labor Statistics approach in that the basic state aid allocation is increased to all districts whose countywide average weekly wage was greater than that of the county containing the 50th percentile of pupils when the counties were ranked by weekly wage. For those districts with weekly wages below the 50th percentile, no adjustment would be made. This adjustment would provide an increase in state aid to 50 percent of the pupils in the state. This recommendation contends that since personnel expenditures represent 85 percent of current operating expenditures, this increase would make school districts more competitive with other employers in the same county for personnel and that the remaining 15 percent of the school budget is purchased in a statewide or national market. Jordan notes, that although the Ohio and Florida approaches contrast in simplicity and complexity, both approaches benefit the high wage areas.[22]

Jordan summarized his review of cost-of-living indices by stating that the results of the legislative efforts to revise state aid programs appear to be that the level of state aid is likely to increase and the access to local leeway is likely to decrease. And, if these conditions prevail, the interest in and the need for cost-of-living adjustments will increase. However, the challenge will remain to identify necessary cost variations with equivalent educational programs and services among local school districts regardless of their economic status.[23]

Hagler conducted a study to determine if cost-of-living differences existed for single (unmarried) teachers in selected school districts in Kentucky in 1975.[24] Hagler concluded the cost-of-living indexes and the comparisons of indexes with wealth factors partially corroborated the findings of earlier studies in this area. Pearson Product Moment coefficients indicated no relationship existed between the food, shelter, and transportation variables, but a significant relationship did exist between the assessed valuation and personal income variables at the one percent level. One conclusion drawn from the data collected for 27 items was that teachers employed by wealthier districts tend to experience a higher cost-of-living. However, Hagler concluded that research has suggested the standard-of-living must also

be considered along with the cost-of-living to determine if a dollar purchases comparable goods and services in various locations in Kentucky.[25]

As a result of a study conducted in Tennessee involving both metropolitan and non-metropolitan urban areas using an adaptation of the Tanner, Stollar, and Tomlinson Resource Allocation Model, Kondwros generally concluded that the cost-of-living varied sufficiently between areas and counties to warrant special adjustments in the distributions of state funds.[26] It is significant to note the study was conducted under the assumptions that, although the cost-of-living was not a direct measure of educational costs, educational costs were affected by differences in the cost-of-living; and the cost-of-living correlated significantly with the cost of delivery of education.[27] An interesting difference between the Florida Price Level Index and the Tennessee Educational Delivery Index is that the Tennessee index is based at 1,0000 for the lowest school district, instead of indices less than 1.0000 recommended in the Florida study.[28] Kondwros maintains that while the Florida index serves as an equalizing function within itself, the rationale for the minimum of 1.0000 in the Tennessee index was that no money generated by the weighted pupil formula should be allocated to another system. Cost of delivery is a function of the total foundation program allocated on a percentage equalizing basis, which is 90 percent state and 10 percent local in Tennessee.[29]

In an attempt to recognize cost-of-living differences among the school districts in Alaska, the State Legislature in 1975 approved of the revision of regional adjustments for rural and isolated areas to include an adjustment factor for the regional differences in the cost-of-living.[30] This feature of the Public School Foundation Program (PSFP), referred to as the Instructional Unit Allotment Index, varies on a scale from 103.75 to 133.75 percent depending on the geographic location of the school districts and other factors.[31] Because of a continuing concern to persons and agencies responsible for equitable funding of educational programs in Alaska's public schools and the formation of 21 Regional Education Attendance Areas, the Department of Education requested that the Center for Northern Educational Research conduct an examination of the relationships among the cost-of-living, instructional allotments, and school operation costs.[32]

With respect to the cost-of-living, the Alaska School Finance Study found that virtually all recent cost-of-living studies in Alaska appear to answer the wrong question, therefore, result in an unclear index for comparing living costs between various locations in Alaska. Second, the most appropriate means of comparison is a budget study which measures differences in prices but not tastes and income. Third, since appropriate budget studies for Alaska do not exist, indices must be compiled from fragmentary data concerning

individual components of a well researched budget adapted for Alaska and combined into a plausible total consumption index. Finally, in comparison with such an index, the current regional differentials appear to inadequately reflect probable true differences in cost-of-living.[33] These findings correspond to an assertion made by Fergus in an appraisal of the Consumer Price Index as a cost-of-living measure that it was not designed and was not intended for geographical comparisons of the cost-of-living. He maintained that the Consumer Price Index was designed to have the primary function of measuring price change within particular geographical areas. Fergus suggested a more suitable measure for making geographical comparisons of living costs in the Bureau of Labor Statistics family budget estimates.[34]

The Alaskan School Finance Study's findings with respect to actual expenditures, and to comparisons of fiscal year 1975-76 expenditures with the Instructional Allotments were: (1) given the data, it was not possible to show whether place-to-place differences in costs of educational programs are caused by differences in unit costs of education or differences in programs; (2) the schedule used to compute instructional units for ADM has more impact on equalizing school funding than the cost-of-living adjustments; (3) when the economies of scale and differences in program contained in the schedule used to derive instructional units were taken into account there was no statistically significant correlation between actual expenditures per instructional unit and the current cost-of-living adjustments in the foundation program; (4) no statistically significant relationship was found between average salaries and cost-of-living, as embodied in the current Instructional Unit Allotments; and (5) differences in expenditures per instructional unit on plant operation and maintenance are typically higher in more rural and northern parts of Alaska than the corresponding differences in the cost-of-living. Also, in some of the district schools with high plant operations and maintenance expenditures, either regular instruction expenditures are low, or local revenue effort is high, or both.[35]

The Alaskan study group concluded plant operation and maintenance costs appear to have different characteristics than both costs-of-living and other costs-of-operation which are not provided for in the foundation formulas. They also concluded, the relationship between regular instruction, plant operation and maintenance, and tax effort appeared to indicate some high maintenance cost districts are having to make extraordinary tax efforts and reduce spending on instruction to stay within the budget. The study group finally concluded there must be recognition that the current formula is only a proxy for the most ideal situation, which would be to conduct a real cost of education study which would include a definition of the basic need in terms of programs rather than dollars.[36]

According to Porter, the U. S. Consumer Price Index is inadequate because it only reflects what carpenters, waitresses, deliverymen, nurses or clerks purchase, a group of people who only make up 30 to 35 percent of the population. Yet, in real life, it plays a crucial role in the distribution of billions of dollars of public and private money. For example, when the consumer index increases, so do the payments to approximately 31.2 million Social Security recipients, 8.5 million workers covered by contracts with cost-of-living clauses, and 2.4 million retired Civil Service and military workers.[37] In an effort to reflect the cost-of-living of more Americans and improve the conceptual framework the Bureau of Labor Statistics phased in two new indexes in February 1978, while continuing to publish the old index for six months. The two new indices - an all urban index and an updated version of the traditional index - represents an attempt to make the index a more accurate and trustworthy measure of price changes by updating the weights assigned to spending categories, the sample of items priced each month, the sample of retail stores, and modernizing the conceptual basis and statistical methods employed. Welch points out, that despite attempts by the Bureau of Labor Statistics to increase the accuracy of the Consumer Price Index, the statistic has limitations including the nature of the Consumer Price Index as an average, the fixed composition of the market basket, inadequate recognition of quality changes, no region to region comparisons, and statistical error.[38]

In conclusion, although cost-of-living type studies are worthy of attention in any review of the "state-of-the-art" of assessing and adjusting for variations in costs of equivalent educational resources, it appears this type of study does not answer many of the questions posed. In noting that pupil units should be weighted according to educational need, and that these weightings should be supplemented by weightings due to variations in sparsity of population and theoretically, in cost-of-living; Johns stated, "Unfortunately, valid tools for measuring variations in the cost of the same standard of living have not yet been developed."[39] Chambers emphasized, with regards to use of a cost-of-living index (Consumer Price Index) approach to approximate the differences in costs of education, that numerous factors other than education costs are included and therefore is not a very appropriate way to adjust for differences in only education costs.[40]

Economics of Scale and Other Related Studies

Many attempts have been made in recent years to reduce or eliminate the differences in the quality of educational services offered across local school districts. There appears to be at least three kinds of equalization that have been initiated by the various states: equalization of property wealth differences, equalization of varying student

needs, and equalization of cost differences. While most states have concentrated on equalization of property wealth and many have also included weighted pupil measures to provide additional aid for varying pupil needs, few states have been able to consider ways to provide equalization for the differences in costs among local school districts.[41]

Over the past two decades many variables have been mentioned as significantly contributing to inter-district cost variation for delivery of equivalent educational services. A few of the more common variables that have been mentioned in the literature are: (1) sparsity of population, (2) high density of population, (3) inefficient size - a diseconomies of scale of schools and/or districts that are too small or too large, (4) great variation in price levels for goods and services in different areas of the state, (5) inefficient purchasing practices, (6) high incidence of vandalism, (7) geographically isolated regions, (8) great variation in topography - altitude and weather, (9) political organization - hiring and purchasing practices, (10) concentration of exempt properties, (11) number of pupils requiring transportation, (12) rank and experience of instructional staff, (13) high incidence of student failure, and (14) capital costs. Even with the great number of variables included in the above list, it would be presumptuous for any student of educational finance to consider such a list as being complete. In fact, it may be impossible to develop a finite list.

Analysis of the above list indicates that, although many of the items are related and some can be eliminated by organizational and policy changes, each one could have a significant impact upon delivery of equivalent educational programs among local school districts in a state. Common logic dictates that the significance of the effects of these factors upon equalization will probably vary greatly. In fact, an inflated maintenace cost due to excessive vandalism, for example, would probably be handled through normal budgeting procedures and would not represent as high a proportion of costs as great differences in price levels would. Of course, any budget adjustment to increase the appropriations for maintenance would probably cause a corresponding decrease in the appropriations of other - possibly more educationally oriented - functional areas. It is entirely possible that any one of (or combination of) the factors mentioned in the above list could cause serious disequalfties of the educational opportunities of pupils in a given district if some appropriate adjustment were not made.

A formula for computing the extra costs of education due to sparsity of population was developed in a study by Johns and was enacted into law by the Florida Legislature in June 1975, however, no funds were appropriated for 1976-77.[42] Johns noted that although the sparsity measure used in the formula was developed for use in states with large school units, an index of extra costs of education due to sparsity

of population could be developed using the following criteria. (1) The sparsity index should not encourage the continuance or establishment of unnecessary, small, inefficient districts; receipt of sparsity supplements should be contingent upon having total area of 400 square miles or more if the enrollment is less than 1500. An additional parameter specified was that the district would have to be a unified school district including grades K-12 or 1-12. (2) The index should not encourage the establishment of unnecessary, small, inefficient school centers, especially high schools - existing school centers should be surveyed by the state education agency to determine whether their continuance is justified. (3) The purpose of a sparsity index is to provide for the extra costs due to sparsity to enable properly organized districts and school centers to provide substantially equivalent programs and services throughout a given state. (4) The measure of sparsity should be a function of the school population, the area in square miles, and the distribution of the pupil population within the district. Although all three of these variables have been condensed into one variable in the Florida sparsity formula because it is a county unit state, small unit states may find it necessary to include these three characteristics as separate variables.[43]

Johns found that valid research analyzing the relationship of school district size to costs had been limited in scope and had restricted generalizability, although a few studies did attempt to adjust for quality. He summarized his review by stating that a study of the effect of sparsity on the cost of providing equivalent educational opportunity should have two characteristics - which appeared to be lacking in the literature reviewed - that are essential to be a valid study of this nature: (1) a measure of equivalency of educational opportunity should be identified that can be used for cross-district comparisons and (2) a measure of cost in addition to present current expenditures should be identified that would be required to provide equivalent opportunity in sparsely populated districts. In addition, if the research is to be used to adjust a state funding formula, Johns felt it essential to identify some measure of sparsity having a high correlation with additional cost due to sparsity, especially for purposes of making future adjustments to the formula to reflect changes in population without conducting another in-depth study.[44]

According to Levin, the size or enrollment of a school or school district is a crucial factor in determining the educational effectiveness for a given level of expenditure.[45] Since the long run average cost curve is expected to be U-shaped, a vertical line drawn from the horizontal axis (abscissa) representing enrollment and a horizontal line drawn from the vertical axis (ordinate) representing costs per pupil to the lowest point of the U-shaped curve will theoretically indicate the optimal size of a given school organization. Therefore, once the long run average cost

curve has been determined from data collected from the school organization, the effects of changing enrollment size can be determined. Since the cost curve is U-shaped, it would be expected that either increasing or decreasing enrollment from the optimal size would increase unit costs. Thus, diseconomies of scale should be expected to result from both schools and districts that are either too large or too small to be efficient.

Osburn and Goishi reported the results of a study analyzing factors influencing costs among area vocational schools in Missouri indicated higher student costs are found among smaller area vocational schools. Although the authors stated they did not wish to imply that vocational training should be limited to large schools - 60 percent of the schools studied had enrollments less than the optimum size (398 students) in one estimate; however, they did want planners to be aware of their findings.[46] The authors concluded that, while other studies of the size expenditure relationships show the optimum size high school to be well over 1,000 students, they found the least cost size for secondary vocational schools in Missouri to be in the range of 400 to 500 students.[47]

Johns reported that, according to the evidence available with regard to efficient district size, maximum economy of scale is reached when a district has 20,000 to 50,000 pupils.[48] Louis and McNamara reported, in an economy of scale study of school districts in Oregon, that although the minimum of the average cost curve was approximately associated with 51,000 ADM, the curve was very flat in the range of 40,000 to 60,000. They concluded that, for policy planning purposes based on this criterion of efficiency, any district within this range could be viewed as optimal.[49] Although the most common use of economies of scale type studies has been to set policy and plan reorganization of administrative units, the evidence seems to indicate this type of analysis should be included in investigations of differences in the cost of providing equivalent educational programs among school districts.

Austin and Holowenzak found an inverse relationship between county income level or school system size and per pupil accountability cost in a study of the component costs of educational accountability for school districts in Maryland.[50] Since the accountability measures include school district expenditures, an important ingredient in any type of educational cost measurement process, this finding has significance for purposes of this review. The results of the Maryland study did not indicate a specific range in enrollment size where economies of scale would exist, but did indicate the cost estimates for small and medium size districts appeared to be quite similar. The results appeared to indicate that since the fixed costs are high the larger school systems (over 50,000 student enrollment) are better able to absorb them by spreading them over their larger student populations. The

authors concluded that legislators and administrators should keep these facts in mind when instituting accountability requirements because the small school systems will probably require additional financial, as well as technical assistance, in instituting any type of comprehensive accountability program.[51]

Marcussen reported that examination of the effect of high school size on cost and instructional program revealed the percent of the total budget allocated to the required program increases as school size decreases and the percent of the total program devoted to required courses increases as school size decreases. Based on the data presented in the study he concluded the critical size school would fall within the size range of 750 to 850 students.[52]

There appears sufficient evidence to indicate that the location and size of schools (and districts) have a significant impact on their relative costs. Factors causing variation in costs of providing educational programs such as isolation cannot be changed in the short run, possibly not even in the long run. Therefore, the best course to action appears to be recognition, analysis, and adjustment for these factors with the long run motive of finding solutions that contribute to educational opportunity.

Cost-of-Education Index Studies

Cost-of-education studies have traditionally been undertaken for purposes of developing budget appropriations and comparing actual expenditures. For 15 years School Management - publication of this journal stopped in 1974 - published an annual cost-of-education index for 32 categories of expenditures. These data were presented on a per pupil (ADA) basis by nine economic regions, by seven size groups, and national average from over 1,700 questionnaire returns.[53] Although this type of cost index has many useful purposes, it does not offer solutions to questions of what causes cost variations and what adjustments are appropriate from the state level to insure equivalent resources. Two other obvious problems of using this type of data are developing comparable definitions for the 32 expenditure categories and the data are given on a per pupil (ADA) basis which represent averages rather than actual prices paid for various goods and services.

Another purpose of earlier cost-of-education index studies was to assess the impact of inflation on school district expenditures. Carter conducted a study of price increases and purchasing power of 10 Texas school districts in 1966 and found expenditures for public education had not been increased sufficiently to purchase the same quantity and quality of education as was purchased in the 1957-58 base period.[54] A third type of purpose for developing a cost-of-

education index during the 1960's was illustrated by a study of twenty school districts in Idaho in 1966. In this study, Bowler used a sample of twenty school districts to develop a cost-of-education index for Idaho. He concluded after analyzing data for the years 1953 through 1965 that, in general, the larger size districts had a larger percent of their budget devoted to instruction. In reference to a relative large increase in funds from the state legislature during 1966, Bowler concluded school districts with a modest increase in expenditures had increased instructional expenditures by a larger percentage than districts which had a large increase.[56]

These studies, only a sample from a number of cost-of-education index studies conducted during the past 20 years, serve to illustrate the point that they were usually conducted to investigate some relationship or current problem; and even though large amounts of data had to be manipulated, they were essentially less complex than other types of financial studies being conducted during this period of time. It must be recognized that although a cost-of-education index study can be used to analyze trends and find relationships, their usefulness is limited without the introduction of variables related to the various causes of the differences in cost of equivalent resources among school districts.

During the seventies a new approach to developing and using cost-of-education indexes began to appear essentially starting with the direct involvement of economists in educational finance by the National Educational Finance Project in 1970,[56] and the development of the Florida Price Level Index by a group of Florida university economists.[57] According to Chambers, there have been two basic kinds of research attempting to construct cost-of-education indices: (1) those that did not use economic theory to aid the analysis, and (2) those that did use a conceptual framework based on economic theory to guide the analysis. He maintains that studies of the first category either made no attempt to distinguish demand, or quality variables, from supply (cost) variables; or made arbitrary assumptions about which were quality and which were supply variables. These initial attempts at trying to construct cost-of-education indices are limited because of the neglect of, or arbitrariness of the treatment of the quality versus cost issue.[58]

The first attempt to apply economic analysis in the area of constructing educational cost indices is generally credited to Brazer.[59] Brazer conducted his study in Michigan in 1974 by basically examining the factors affecting instructional costs.[60] His study has been criticized on the grounds he failed to appropriately specify which determinants of teachers' salaries are endogenous (variables within the control of local school decision makers, such as quality) and which were exogenous (variables outside the control of local decision makers, such as supply factors) to school district

decision makers.[61]

In a summary of three papers, including the Brazer study mentioned above, Tron concluded that the problem of whether to adjust state aid for local cost differences is both a question of policy and of techniques. The underlying assumption of each study was that one dollar in state aid or other revenue will not buy the same amount of educational goods and services throughout the state because of differences in local prices. The major impact of these studies was the identification of three major problems stemming from the methodology imposed by statistical analysis and from the limitations of the data.[62]

One problem confronting the researchers in all three studies was the determination of which district features were supply related variables and which were demand related. A second problem, highlighted by these studies, was how to account for the approximately 30 percent unexplained variance in teacher salaries. However, Tron interjected that in general, social scientists would view the 70 percent variation in teacher salaries explained by the analysis to be satisfactory. The third problem, which remained unresolved, was how to define and include teacher quality in analysis of local cost differences.[63]

Chambers recently completed a study for the Missouri Governor's Conference on Education in which cost-of-education indices among all 565 school districts in the state of Missouri and regional cost indices based just on teachers' salaries were developed.[64] Based on 1974-75 data, these indices are purported to indicate the differences in the level of education services a dollar can buy in one school district compared to what it can buy in another school district. The author asserted that the indices developed can be used not only in Missouri's state equalization aid formula to equalize purchasing power of the educational dollar among local school districts, but also that the methodology developed by the study can be used by other states to equalize wealth, pupil need and costs through a single state equalization aid formula.[65]

Chambers stated that of two alternative ways to measure differences in educational costs; the first, the cost-of-living approach, was rejected because it includes numerous factors other than educational costs. The second alternative, the market price schedule, was selected because it deals directly with measures of price variation and sources of these variations. The author acknowledged that the market price schedule approach is commonly criticized because it ignores the effects of unions and collective bargaining, price variations caused by different pupil need and pupil size factors, and the constraints placed on districts with declining enrollments by seniority and tenure laws, but they asserted the methodology developed in the Missouri study to

date has dealt intensively with all but the last problem.[66]

The economic framework used for developing the cost-of-education indices in Missouri recognized that differences in education expenditures across school districts result from two basic factors: (1) variation in the amount (or quality) of education services purchased, and (2) variation in the cost. While the cost of educational services is determined by factors outside the control of school decision makers, the amount or quality of services purchased by decision makers is a matter of local choice within given budget constraints. In constructing the cost-of-education index for Missouri an attempt was made to hold the amount of educational services equal across all districts in order to measure only the differences in expenditures caused by differences in cost or price. The separation and holding constant of the demand (quality) variables from the supply (cost) variables was a major goal of the Missouri study.[67]

Two sets of factors causing variations in the cost of producing a given quality of education services were identified as: (1) those affecting the supply of school inputs; namely, the relative attractiveness of the district as a place to work and local labor market conditions, and (2) those factors affecting the technology of education production, specifically, pupil need and scale of district operations. It was emphasized that two additional constraints on district choice influence the cost of school inputs and are outside the control of local decision makers: (1) seniority provisions and tenure laws, and (2) capital constraints. The authors summarized their approach by stating that the variation in supply and technology factors which are both outside the control of local decision makers are the cause of differences in the amount of services a dollar of education spending will purchase. Therefore, the variation in supply and technology factors should be used to calculate cost-of-education indices across local school districts.[68]

Chambers concluded that although he felt the methodology developed in the Missouri study can be easily applied to other states, the research is not definitive. Future research should attempt to use output measures as control variables and a full accounting of the limitations caused by tenure and seniority laws and capital (school building) constraints, should be included. Chambers pointed out that the study had produced two cost indices based on teacher salaries: a district-by-district index and a regional index; and three cost indices based per pupil expenditures; a pupil need index, a size (ecnomies or diseconomies of scale) index, and a supply component (all of the other supply variables) index. The authors concluded that, on the average, metropolitan districts would receive more aid and the non-metropolitan districts receive less aid through application of the cost indices.[69]

Summary

One question that must be posed concerning any type of adjustment of differences in costs of delivery of educational services before any actions are taken is, "How much will it cost?" Without exception, all of the various techniques discussed in this paper require data to be collected and analyzed. The current situation in Florida is a good example of the efforts required to distribute funds to local school districts. However, Florida does have the advantage of having only 67 county school districts, an extensive system for counting full-time equivalent pupils by program, a uniform accounting system based on Handbook II Revised, a comprehensive program cost reporting system, a working efficiency-effectiveness evaluation system, and the technical personnel to support such efforts. Before a state decides to institute any of the models presented in this paper, it would seem appropriate to consider both the costs and the benefits.

Regardless of the costs, the benefits over the long run probably indicate some action should be taken. Based on the various discussions in this text, it seems apparent that the final answer to the problem of adjusting for cost differences in the delivery of equivalent education programs has not yet been discovered. The fact that most of the models (including the Missouri model) deliver more funds to metropolitan districts is suspect when common sense dictates that this probably occurs because the data are based on current expenditures rather than actual cost differences. Also apparent is the fact that in all of the studies, costs are expressed on a per pupil basis. It would seem a true market basket (not a cost-of-living marker basket) of educational goods and services based on actual budget line items would be more appropriate for use in comparing costs and developing indices.

The fact that statewide per pupil and per teacher costs represent averages that are inherently weighted by the program mix contribution of fewer, but significantly larger school districts should also be considered. While it is true that all models do not use statewide averages, the use of average figures should be carefully examined. It seems reasonable that a model used to adjust for cost differences beyond the control of local administrators should have some facility for incorporating the special desires and characteristics of each district within a given state. The efforts being made in Alaska may well serve these ends, as the great diversity of the state requires careful consideration.

The cost-of-education index study completed by Chambers for the Governor's Conference on Education in Missouri appears to be the most significant study to date in the continuing effort to equalize educational expenditures among school districts. While the statistical technique used to analyze the data, multivariate regression, does not represent

an advance in statistical analysis; the application of economic theory to analyze the problem of identification and separating the various supply and demand variables does provide a new direction for cost-of-education index research. Odden reported that the Education Commission of the States is refining its work in Missouri and that the National Institute of Education has contracted with Killalea Associates to do cost-of-education index work as well.[70]

The Education Finance Center for the Education Commission of the States recently announced it has entered into contract with the California State Board of Education to conduct a policy issue study, part of which will focus on development of geographical cost-of-education differentials and indices.[71] Another indication of interest in this area is represented by a study currently being conducted by the Florida State Department of Education which will assess the impact and appropriateness of the current Florida Cost-of-Living Index and will focus on development of cost-of-education indices.[72] Therefore, it appears much effort will be expended in the near future in developing the economic approach to cost-of-education indices. Hopefully, the results will benefit all students regardless of their geographic location or economic status.

Footnotes

[1]The Condition of Education - 1976 Edition, National Center for Education Statistics, (Washington, D.C.: United States Government Printing Office, 1976), p. 143.

[2]Ellwood P. Cubberley, Public Education in the United States, (Cambridge, Massachusetts: The Riverside Press, 1919).

[3]Roe L. Johns. "An Index of Extra Costs of Education Due to Sparsity of Population." Journal of Educational Finance 1 (Fall 1975): 159.

[4]K. Forbis Jordan, "Finance - Is There a Recession in School Finance?" 62nd Annual Volume of Proceedings, Addresses, and Research Papers of the Association of School Business Officials of the United States and Canada, (Boston, Massachusetts: 1977), p. 206.

[5]Ibid., p. 208.

[6]Conditions of Education, p. 26.

[7]Ibid., pp. 152-153.

[8]Charles T. Roberts and Allan R. Lichtenberger, Financial Accounting: Classifications and Standard Terminology for Local and State School Systems, State Educational Records and Report Series: Handbook II, Revised, D HEW Publication No. (OE) 73-11800 (Washington, D.C.: United States Government Printing Office, 1973), p. 22.

[9]Thomas Evans Hagler, A Study to Develop a Cost-of-Living Index for Selected School Districts in the State of Kentucky, (Ph.D. dissertation, University of Florida, 1975), pp. 8-14.

[10]James C. Simmons, "How Florida Derived and Used Price Level Index," Planning and Changing 6 (Fall and Winter 1976), p. 191.

[11]Ibid., p. 190.

[12]Ibid.

[13]Florida Education Finance Program: State Support for Public Schools 1976-77, Florida Department of Education, (Tallahassee, Florida: 1976), MIS Series 77-04, p. 12.

[14]Ibid., p. 12 and Appendix H.

[15]James N. Fox, "Cost-of-Living Adjustments Right Intent, Wrong Technique." Phi Delta Kappan 56 (Arpil 1975): pp. 548-549.

[16]Ibid.

[17]James C. Simmons, "Comments on 'Cost-of-Living Adjustments in School Finance'," Phi Delta Kappan 57 (October 1975): p. 120.

[18]Ibid.

[19]Ibid.

[20]K. Forbis Jordan, "Cost-of-Living Indices and State School Support Programs," The Library of Congress, Congressional Research Services, Washington, D.C., (November 1977): p. 5. (Mimeographed)

[21]Ibid., p. 6, citing R. L. Johns, "The Cost of Delivering Equivalent Educational Services," Futures in School Finance: Working Toward a Common Goal, (Bloomington, Indiana: Phi Delta Kappan, 1975): pp. 93-77.

[22]Ibid., p. 9.

[23]Ibid., pp. 9-10.

[24]Hagler, pp. 150-152.

[25]Ibid.

[26]Jerry Myles Kondwros, A Developmental Study of an Educational Delivery Index for Resource Allocation Based on Regional Desparities in the Cost of Living Within the State of Tennessee, (Ed.D. dissertation, University of Tennessee, 1975).

[27]Ibid.

[28]C. Kenneth Tanner and Jerry M. Kondwros, "Cost of Delivering Education: A Planning Model," Paper delivered at the American Education Finance Conference, San Antonio, Texas, March 1977), pp. 25-26. (Mimeographed)

[29]Ibid.

[30]Alaskan Interregional Cost Differentials: An Examination of Costs-of-Living, Public School Foundation Program Instructional Unit Allotments, and School Operations Costs in Alaska, Center for Northern Educational Research, University of Alaska, Fairbanks, (ERIC Microfiche ED 137 920, 1977), p. 19.

[31]Ibid., p. 24.

[32]Ibid., p. iii.

[33]Ibid., p. 116.

[34]James T. Fergus, "Cost-of-Living Comparisons: Oasis or Mirage?," Economic Review, Federal Reserve Bank of Atlanta, July 1977, pp. 92-100.

[35]Alaskan Interregional Cost Differentials, pp. 118-126.

[36]Ibid., p. 124.

[37]Sylvia Porter, "Price Index Table Changed," Tallahassee Democrat, 28 November 1977, p. 6.

[38]Judith K. Welch, "Major Revisions Update CPI," Economic Leaflets, College of Business Administrators, University of Florida, November 1977, Vol. 36, No. 9.

[39]Roe L. Johns, "Analytical Tools in School Finance Reform," Journal of Educational Finance 2 (Spring 1977): p. 501.

[40]Jay G. Chambers, Allen Odden, and Phillip E. Vincent, Cost-of-Education Indices Among School Districts: An Application to the State of Missouri, (Denver, Colorado: Education Commission of the States, ERIC Microfiche ED 134 589, December 1976): p. 3.

[41]Ibid., p. 1.

[42]Johns, Sparsity Index, p. 202.

[43]Ibid.

[44]Ibid., pp. 166-167.

[45]Henry M. Levin, "The Effect of Different Levels of Expenditure on Educational Output," Economic Factors Affecting the Financing of Education, (Gainesville, Florida: National Educational Finance Project, Vol. 2, 1970): p. 184.

[46]Donald D. Osburn and Frank H. Goishi, "An Analysis of Factors Influencing Costs Among Area Vocational Schools," Journal of Industrial Teacher Education 11 (Summer 1974): pp. 48-56.

[47]Ibid., p. 55.

[48]Johns, Sparsity Index, p. 181.

[49]Larry St. Louis and James F. McNamara, "Economies of Scale for a State System of Public School Districts," Socio-Economic Planning Sciences 6 (June 1973): p. 301.

[50]Gilbert R. Austin and Stephen P. Holowenzak, "Component Costs of Educational Accountability," Planning and Changing 5 (Fall 1974): p. 174.

[51]Ibid., p. 170.

[52]Jack Irvin Marcussen, Effect of High School Size on Cost and Instructional Program (Ed.D. dissertation, University of Illinois at Urbana-Champaign, 1972).

[53]"How to Use the New Cost-of-Education Index," School Management 18 (January 1974): p. 16. NOTE: the compilers of the School Management Cost of Education Index, Market Data Regrieval, Inc., continue to offer this service under the title: National Comparison: Local School Costs. 1976-77. Third Edition (ERIC Microfiche, ED 139 070, 1977).

[54]Thomas Dan Carter, The Development of a Procedure for Computing a Cost-of-Education Index for the Public Schools of the State of Texas (Ph.D. dissertation, University of Texas, 1966).

[55]Orson Lloyd Bowler, Cost-of-Education Index for Idaho Public School Districts as Related to a Cost Analysis of Teton County Schools (Ed.D. dissertation, University of Utah, 1966).

[56]NEFP, Volume 5, Foreword.

[57]Simmons, p. 190.

[58]Chambers, Missouri Cost Index, p. 33.

[59]Allen Odden, John Augenblick, and Philip E. Vincent, School Finance Reform in the States, 1976-77: An Overview of Legislative Actions, Judicial Decisions and Public Policy Research, (ERIC Microfiche ED 139 758, 1977), p. 22.

[60]Esther O. Tron, "Introduction and Summary," Selected Papers in School Finance: 1975, (ERIC Microfiche, ED 135 062, 1977), p. 9.

[61]Jay G. Chambers, "Educational Price Differentials: A Clarification of the Issues," (ERIC Microfiche, ED 123 720), p. 19.

[62]Ibid., pp. 5-6.

[63]Ibid., pp. 6-8.

[64]Chambers, Missouri Cost Index, p. 1 and 35.

[65]Ibid., p. 1.

[66]Ibid., p. 4.

[67]Ibid., pp. 7-8.

[68]Ibid., pp. 7-12.

[69]Ibid., pp. 26-32.

[70]Odden, School Finance Reform Overview, p. 22.

[71]Finance Facts, Education Commission of the States, September 1977.

[72]Telephone interview with Edgar Fresen, Florida Department of Education Staff, Tallahassee, Florida, December 20, 1977.

Bibliography

Alaskan Interregional Cost Differentials. An Examination of Costs of Living, Public School Foundation Program Instructional Unit Allotments and School Operations Costs in Alaska. Fairbanks, Alaska: ERIC Microfiche, ED 137 920, 1977.

Albert, James G. "Wanted: Experiments in Reducing the Cost of Education." Phi Delta Kappan 55 (March 1974): 444-445.

Austin, Gilbert R., and Holowenzak. "Component Costs of Educational Accountability." Planning and Changing 5 (Fall 1974): 167-174.

Bowler, Orson Lloyd. Cost of Educational Index for Idaho Public School Districts as Related to a Cost Analysis of Teton County Schools. Ed.D. dissertation, University of Utah, 1966.

Burke, Joel S., and Kirst, Michael W. "How the Federal Government Can Encourage State School Finance Reform." Phi Delta Kappan 55 (December 1973): 241-244.

Carroll, Stephen J. "School District Expenditure Behavior." The Journal of Human Resources 11 (Summer 1976): 317-327.

Carter, Thomas Dan. The Development of a Procedure for Computing a Cost of Education Index for the Public Schools of the State of Texas. Ph.D. dissertation, University of Texas, 1966.

Chambers, Jay G. A Model of Resource Allocation in Public School Districts: A Theoretical and Empirical Analysis. EIRC Microfiche, ED 123 718, 1976.

Chambers, Jay G. and Others. Cost-of-Education Indices Among School Districts, An Application to the State of Missouri. Report No. F76-3. ERIC Microfiche, ED 134 589, 1977.

Chambers, Jay G. Educational Price Differentials: A Clarification of the Issues. ERIC Microfiche, ED 123 720, 1976.

Chambers, Jay G. The Impact of Collective Bargaining for Teachers on Resource Allocation in Public School Districts. ERIC Microfiche, ED 123 719, 1976.

Christenson, Gerald William. A Study of the Relationships Between Selected Educational Cost Factors and Differences in Adjusted Maintenance Costs in Six Twin Cities Metropolitan Area School Districts. Ph.D. dissertation, University of Minnesota, 1972.

Cohn, Elchanan. "A Proposal for School Size Incentives in State Aid to Education." Journal of Education Finance 1 (Fall 1975): 216-225.

Cubberley, Ellwood P. Public Education in the United States. Cambridge, Massachusetts: The Riverside Press, 1919.

Education Commission of the States, The Fiscal Impacts of Declining Enrollments in Four States - Michigan, Missouri, South Dakota and Washington. Denver: Education Finance Center, December 1976.

Endres, Michael J. "Financing School Facility Construction in a Tight Economy." Journal of Education Finance 2 (Fall 1976): 173-183.

Evaluation of the Relationship Between School Size and School Costs. Irvine Unified School District, California. ERIC Microfiche, ED 117 821, 1976.

Fergus, James T. "Cost-of-Living Comparisons: Oasis or Mirage?" Economic Review. Federal Reserve Bank of Atlanta, July 1977.

Finance Facts. Education Commission of the States, September 1977.

Financing the Public Schools of South Dakota. Gainesville, Florida: National Educational Finance Project, 1973.

Flora, Jan L. "Equity in Financing Primary and Secondary Education: A Midwestern Example (Kansas)." American Journal of Economics and Sociology 35 (April 1976): 175-189.

Florida Department of Education. Florida Education Finance Program: State Support for Public Schools 1976-1977. Tallahassee, Florida: MIS Statistical Report, Series 77-04, November 1976.

Florida Department of Education. 1975-76 Program Cost Analysis for Florida Schools. Tallahassee, Florida: MIS Statistical Report, Series 77-09, December 1976.

Florida Price Level Index, Tallahassee, Florida: Department of Administration, 1977.

Fox, James N. "Cost-of-Living Adjustments: Right Intent, Wrong Technique." Phi Delta Kappan 56 (April 1975): 548-550.

Grant, W. Vance. "Statistic of the Month: Comparing Expenditures for Schools with Personal Income." American Education 10 (December 1974): Backcover.

Gwynne, James. "School Finance: The Case for Equalization of Opportunity." Intellect, June 1977, pp. 420-422.

Hagler, Thomas Evans. A Study to Develop a Cost-of-Living Index for Selected School Districts in the State of Kentucky. Ph.D. dissertation, University of Florida, 1975.

Hay, Leon E., and Milesell, R. M. Governmental Accounting Homewood, Illinois: Richard D. Irwin, Inc., 1974.

Hight, Joseph E. "Full State Funding and the Distribution of Educational Resources in Hawaii." National Tax Journal 27 (March 1974): 1-8.

Hubbard, Ben C. Additional Financial Resources for Education. ERIC Microfiche, ED 123 721, 1976.

Jacobson, Robert L. "Struggling with Inflation: Can the Schools Get Out From Under?" Compact 8 (November 1974): 8-12.

Johns, Roe L. "Analytical Tools in School Finance Reform." Journal of Education Finance 2 (Spring 1974): 499-508.

Johns, Roe L. "An Index of Extra Costs of Education Due to Sparsity of Population." Journal of Education Finance 1 (Fall 1975): 159-204.

Johns, Roe L. "The Cost of Delivering Equivalent Educational Services." Futures in School Finance: Working Toward a Common Goal. Bloomington, Indiana: Phi Delta Kappan, 1973.

Johns, Roe L. "The Evolution of the Equalization of Educational Opportunity in Florida 1926 to 1976." Institute for Educational Finance, University of Florida, 1976. (Mimeographed)

Johns, Thomas L. "1975 School Aid Legislation: A Look at Three States." Journal of Education Finance 1 (Winter 1976): 397-406.

Jordan, K. Forbis, and Alexander, Kern. Financing the Public Schools of Indiana. Indianapolis, Indiana: A Report for the Interim School Finance Study Committee and the Legislative Council, 1975.

Jordan, K. Forbis. "Cost-of-Living Indices and State Aid Programs." Association of School Business Officials of the United States and Canada, 62nd Annual Volume of Proceedings. Boston, Massachusetts: October 2-6, 1976.

Jordan, K. Forbis. "Cost-of-Living Indices and State School Support Programs." The Library of Congress, Congressional Research Services, Washington, D.C., November, 1977.

Jordan, K. Forbis, and Hanes, Carol E. "Financing Education in an Era of Limits." Phi Delta Kappan 57 (June 1976): 667-681.

Kondwros, Jerry Miles. A Developmental Study of an Educational Delivery Index for Resource Allocation Based on Regional Disparities in the Cost-of-Living Within the State of Tennessee. Ed.D. dissertation, University of Tennessee, 1975.

Levin, Henry M. "The Effect of Different Levels of Expenditures on Educational Output." Economic Factors Affecting the Financing of Education. Gainesville, Florida: National Educational Finance Project, Volume 2, 1970.

Loren, Parke B., and Elliot, Jeffrey B. "Teacher Salaries and the U. S. Economy." Phi Delta Kappan 56 (April 1975): 546-547.

Louis, Larry St., and McNamara, James F. "Economies of Scale for a State System of Public Districts." Socio-Economic Planning Sciences 7 (June 1973): 295-303.

McBridge, Robert H. "Where Will the Money Come From? Financing Education Through 1980-81." Phi Delta Kappan 58 (November 1976): 248-249.

McLure, William P. "Measuring Comparability: Intra-District Equalization." Bureau of Educational Research, College of Education, Urbana, Illinois, April 1973. (Mimeographed)

Marcussen, Jack Irvin. Effect of High School Size or Cost and Instructional Programs. Ed.D. dissertation, University of Illinois at Urbana-Champaign, 1972.

Matthews, Joseph L. Comparisons of State, County and School District Purchasing Costs for Supplies in Maricopa County, Arizona. Ed.D. dissertation, Arizona State University, 1973.

Medlock, James Richard. The Relation of Teacher Salary Schedules to Education Costs in Twenty Illinois Unit School Districts. Ed.D. dissertation, University of Illinois at Urbana-Champaign, 1973.

Musemeche, Richard A. "A Comparison of State Bid Laws." Journal of Education Finance 2 (Summer 1976): 83-87.

National Comparison: Local School Costs. 1976-77. Third Edition. Market Data Retrieval, Westport, Connecticut. ERIC Microfiche, ED 139 070, 1977. Note: Document not available from EDRS.

Odden, Allan and Others. School Finance Reform in the States, 1976-1977: An Overview of Legislative Actions, Judicial Decisions and Public Policy Research. Education Commission of the States, Denver, Colorado. ERIC Microfiche, ED 139 758, 1977.

Osburn, Donald D., and Goishi, Frank H. "An Analysis of Factors Influencing Costs Among Area Vocational Schools." Journal of Industrial Teacher Education 11 (Summer 1974): 48-56.

Peck, John E. "State Funding of the Schools: Need vs. Ability." School Management 18 (November 1974): 22-24.

Phi Delta Kappa. Financing the Public Schools: A Search for Equity. Bloomington, Indiana: The Phi Delta Kappa Commission on Alternative Designs for Funding Education, 1973.

Pollack, Rubin. "What This Year's Cost of Education Index Shows." School Management 18 (January 1974): 14-67.

Porter, Sylvia. "Price Index Table Changed." Tallahassee Democrat, 28 November 1977, p. 6.

Roberts, Charles T., and Lichtenberger. Financial Accounting: Classifications and Standard Terminology for Local and State School Systems, State Educational Records and Report Series: Handbook II Revised, DHEW Publication No. (OE) 73-11800. (Washington, D.C.: United States Printing Office), 1973.

Rosmiller, Richard A., and Moran, Thomas H. "Cost Differentials and Cost Indices: The Assessment of Variations in Educational Program Costs." School Finance in Transition: Proceedings of the 16th National Conference on School Finance. Gainesville, Florida: April 1-3, 1973.

Rumbaugh, Stanley A. "Cost of Education Differentials: The Search for the Missing Link." Paper presented at the American Education Finance Conference, San Antonio, Texas, March 1977.

Sabulao, Gloria Alzate. Relationships Among High School Size, Costs, and Other Selected Variables. Ph.D. dissertation, Illinois State University, 1977.

Simmons, James C. "Comments on 'Cost-of-Living Adjustments in School Finance'." Phi Delta Kappan 57 (October 1975): 120.

Simmons, James C. "How Florida Derived and Uses Price Level Index." Planning and Changing 6 (Fall 1976): 193-197.

"Status Report of State Studies on School Finance." Gainesville, Florida: National Educational Finance Project, March 1973. (Mimeographed)

Summers, Anita A., and Wolfe, Barbara L. "Intradistrict Distribution of School Inputs to the Disadvantaged: Evidence for the Courts." The Journal of Human Resources 11 (Summer 1976): 328-342.

"Superintendent-Teacher Salary Gap Narrows." The School Administrator, January 1974, pp. 1-4.

Tanner, C. Kenneth, and Kondwros, Jerry M. "Cost of Delivering Education: A Planning Model." A paper delivered at the American Education Finance Conference, Hilton Palacio Del Rio, San Antonio, Texas, 21 March 1977.

The Condition of Education: 1976 Edition, by Mary A. Galladay. Washington, D.C.: Government Printing Office, 1976.

Townsel, Alvin H. "Adjustments for Urban Fiscal Problems." Journal of Educational Finance 2 (Summer 1976): 50-71.

Tron, Esther O. Public School Finance Programs, 1975-76. Washington, D.C.: Government Printing Office, 1976.

Tron, Esther O. and Others. Selected Papers in School Finance: 1975. ERIC Microfiche, ED 135 062, 1977.

Weiss, Edmund H. "Should Schools Get a Bigger Bang for Their Buck?" School Management 18 (November 1974): 18-21.

Welch, Judith K. "Major Revisions Update CPI." Economic Leaflets. College of Business Administration, University of Florida, November 1977.

Wood, Norman J. "Survey of Florida Teacher Purchases, 42 Counties, Results and Analysis." Athens, Georgia: University of Georgia, 1974.

Wynkoop, Robert J. "Trends in School Finance Reform." Phi Delta Kappan 56 (April 1975): 542-545.

Zuelke, Dennis C., and Frohreich, Lloyd E. Collective Negotiations and Teacher's Salaries: Some Evidence from Wisconsin. ERIC Microfiche, ED 117 823, 1976.

CHAPTER TWO

THE STUDY DESIGN AND PROCEDURES

The Adequate Program for Education in Georgia (APEG) represents an attempt to provide an adequate education for all pupils in Georgia. The plan provides for the differential application of the state's resources toward the satisfaction of the varying needs of pupils. The state plan also recognizes differences in the financial ability of local education agencies to provide appropriate programs, facilities, and supportive services to meet the needs of the pupils they serve. However, APEG does not take into consideration variations in the costs of resources necessary to provide an adequate program of education.

The purpose of this study of resource cost variations was to estimate the impact of differences in the costs of resources on equality of educational opportunity. The process used to arrive at this judgment can be conceptually divided into three steps. Step One was designed to arrive at a measure of the relative educational needs of pupils in a sample of school districts. Relative needs, as defined in this study, were based exclusively on the educational needs of students and did not consider the costs of resources.

Step Two focuses on differences in the expenditures of a sample of local school districts for resources of equivalent quality. Differences in the costs of resources, as defined in this study, were based exclusively on expenditures for specific resources and did not take into consideration the educational needs of students.

The third step integrated measures of the educational needs of students and the costs of resources for the sample districts to arrive at indices of relative financial needs. From these indices the effect of differences in the cost of resources on the equity of funds distributed under APEG was estimated.

Preliminary activities for the initiation of this study included: developing operational definitions, integrating relationships among operational definitions into a schematic plan, and designing strategies to implement the study. A report of these activities follows.

Operational Definitions

The operational definitions formulated for this study are technical in nature and require mathematical computations. To facilitate understanding of the definitions as they are presented, an example showing data for three

hypothetical school districts is given in Figure 2-1. (See: List of Terms for a summary explanation of the terms used.) Following each operational definition, the data from Figure 2-1 are used to illustrate the application of the data to the operational definition.

Relative Needs by Categories (RNC)

The distribution dimension of the state plan (APEG) is based on support for specific categories of educational needs as defined in statutes. For the purpose of this study, the relative needs by categories (RNC) of each district in the sample were considered to be a function of the needs of all districts in the sample. Needs were defined in terms of the number of units of measure, (for example, the number of pupils in average daily attendance) on which funds were disbursed under APEG. Individual district needs by categories (DNC) were therefore defined as the number of appropriate units of measure it had for each category of support. In like manner, the needs of the sample population for each category (SNC) were determined by summing the DNCs of all districts.

Relative needs by categories of support of each district (RNC) were defined by the following equation:

$$RNC = \frac{DNC}{SNC}$$

Illustration:

RNC (District #1): $\frac{1,000}{10,000} = .10$, $\frac{300}{2,000} = .15$

RNC (District #2): $\frac{3,000}{10,000} = .30$, $\frac{700}{2,000} = .35$

RNC (District #3): $\frac{6,000}{10,000} = .60$, $\frac{1,000}{2,000} = .50$

Need Index (NI)

An operational definition for an index of total needs (NI) of sample districts required a method of summing RNCs for all categories of support which reflected an appropriate weighting for each category. The method selected was based upon the assumption that the Georgia General Assembly considered the relative importance of each category of financial support defined in APEG and expressed their judgments in the appropriations act for the 1975-76 school year.

Figure 2-1. Illustrative data for three hypothetical districts three items of expenditure, and two categories of support

	DNC	ENC	ACS	AD	TAS	DRC	SRC	SEBA	TES
District #1	1,000 ADA	10,000 ADA	$15,000	$4,000	$20,000	$ .90	$ 1.00	$ 3,000	$30,000
	300 MI	2,000 MI	$ 5,000			$ 2.00	$ 2.00	$ 7,000	
						$22.00	$20.00	$20,000	
District #2	3,000 ADA	10,000 ADA	$15,000	$6,000		$ 1.00	$ 1.00	$ 3,000	
	700 MI	2,000 MI	$ 5,000			$ 3.00	$ 2.00	$ 7,000	
						$20.00	$20.00	$20,000	
District #3	6,000 ADA	10,000 ADA	$15,000	$10,000		$ 1.10	$ 1.00	$ 3,000	
	1,000 MI	2,000 MI	$ 5,000			$ 1.00	$ 2.00	$ 7,000	
						$18.00	$20.00	$20,000	

List of Terms

ACS - Appropriations from the state, by Category of support under the state plan, to the Sample districts

AD - total Appropriations to individual Districts under the state plan

DNC - individual District's Needs by Categories of support under the state plan

DRC - District Resource Costs (i.e.: the cost of specific resources purchased by individual districts)

EAAPEG - Equity of Appropriations under the Adequate Program for Education in Georgia

EAPEG - Equity of the distribution dimension of the Adequate Program for Education in Georgia

ERCV - Effect of Resource Cost Variations on the equity of the distribution dimension of the state plan

MAS - Mean Appropriations to the Sample districts

NI - educational Need Index of individual districts

RCI - Resource Cost Index for individual districts

RFN - Relative Financial Needs of individual districts

RNC - Relative Needs of individual districts by Categories of support under the state plan

RRCBA - Relative Resource Costs of individual districts by Budget Account numbers for 1975-76

SEBA - Sample districts' Expenditures by Budget Account

SNC - Sample districts' Needs by Categories of support under the state plan

SRC - Sample Resource Cost (i.e.: the mean cost of specific resources purchased by the sample districts)

TAS - Total Appropriations to the Sample districts under the state plan

TES - Total Expenditures of the Sample districts

The amounts appropriated under APEG (legislative appropriations plus required contributions of local education agencies) and the total allocations to the sample districts for each category of support (ACS) provided the data for determining the weights to be applied to the corresponsing category of needs for the purposes of summing RNCs to arrive at an operational definition of NI. The process of arriving at an operational definition of NI involved several sequential mathematical operations. First, the RNCs of each sample district were multiplied by the appropriate ACSs. Second, the products of each (RNC) (ACS) multiplication were summed for each district. Third, the resulting sums were divided by the mean appropriations to the sample districts (MAS) under APEG for all categories of support considered in this study to all districts in the sample. This process resulted in an index of need (NI) for each sample district expressed as a decimal fraction. The NI for each sample district was defined by the following equation:

$$NI = \frac{\Sigma(RNC)(ACS)}{MAS}$$

Illustration:

$$\text{NI (District \#1)} = \frac{(.10)(\$15,000) + (.15)(\$5,000)}{\$6,667} = .3375$$

$$\text{NI (District \#2)} = \frac{(.30)(\$15,000) + (.35)(\$5,000)}{\$6,667} = .9375$$

$$\text{NI (District \#3)} = \frac{(.60)(\$15,000) + (.50)(\$5,000)}{\$6,667} = 1.7250$$

Equity of Appropriations Under the Adequate Program for Education in Georgia (EAAPEG)

Equity of appropriations under the Adequate Program for Education in Georgia (EAAPEG), as described here, applied only to appropriations of the Georgia General Assembly plus required local effort. EAAPEG did not consider any supplementary or enrichment funds generated soley at the discretion of local districts. EAAPEG was simply an attempt to determine the extent APEG resulted in pupils served by sample districts having equal access to the resources of the state as a whole.

The operational definition of EAAPEG is conceived as a mathematical expression of the extent appropriations under APEG were allocated toward the satisfaction of the educational needs of pupils as expressed in the NIs of the sample districts. The process involved in computing an index of EAAPEG follows. First, the NI of each sample district was

multiplied by the mean appropriations to the sample districts (MAS). Second, the appropriations under the state plan to each sample district (AD) were subtracted from the (NI)(MAS) product. Third, the absolute values of these differences were summed for all districts in the sample. Fourth, the resultant sum was divided by two times the total appropriations to the sample districts (TAS). (The total appropriations to the sample districts was multiplied by two because the assumption was made that under-funding to a district was the direct result of over-funding of some other district. Unless this adjustment is made inequities would be twice as large as shown in this report.) Fifth, the quotient obtained in step four was subtracted from 1.00 (the perfect EAAPEG index). The operational definition of EAAPEG is:

$$EAAPEG = 1.00 - \frac{\Sigma\left|(NI)(MAS)-(AD)\right|}{2\ TAS}$$

Illustration:

$$EAAPEG = 1.00 \text{ minus}$$

$$\frac{\left|(.3375)(\$6,667)-(\$4,000)\right|}{(2)(\$20,000)}$$

$$+\ \frac{\left|(.9375)(\$6,667)-(\$6,000)\right|}{(2)(\$20,000)}$$

$$+\ \frac{\left|(1.7250)(\$6,667)-(\$10,000)\right|}{(2)(\$20,000)}$$

$$EAAPEG = 1.00 - .0875$$

$$EAAPEG = .9125$$

Relative Resource Costs by Budget Accounts (RRCBA)

A high degree of equality of access to the wealth of the state as a whole under APEG undoubtedly contributes to equality of educational opportunity. However, perfect equity may exist in this respect and still substantial inequities in educational opportunities persist. If the costs of securing equivalent resources differ greatly among the districts of the state, then these variations may result in critical differences in the educational opportunities of pupils within the state.

To obtain an equitable measure of the impact of cost variations on equality of educational opportunity the costs of selected items of expenditure in specific budget accounts were gathered from the sample districts. The relative

resource costs by budget accounts (RRCBA) for each sample district were defined as the costs of securing selected resources in each budget account for the district (DRC) divided by the unweighted mean cost of the same resources in all districts in the sample (SRC). The operational definition for RRCBA follows:

$$RRCBA = \frac{DRC}{SRC}$$

Illustration:

RRCBA (District #1) =

$$\frac{\$.90}{\$1.00} = .9000, \quad \frac{\$2.00}{\$2.00} = 1.0000, \quad \frac{\$22.00}{\$20.00} = 1.1000$$

RRCBA (District #2) =

$$\frac{\$1.00}{\$1.00} = 1.0000, \quad \frac{\$3.00}{\$2.00} = 1.5000, \quad \frac{\$20.00}{\$20.00} = 1.0000$$

RRCBA (District #3) =

$$\frac{\$1.10}{\$1.00} = 1.1000, \quad \frac{\$1.00}{\$2.00} = .5000, \quad \frac{\$18.00}{\$20.00} = .9000$$

Resource Cost Index (RCI)

An operational definition of a resource cost index (RCI) required a method of summing the RRCBAs of each sample district so as to obtain an equitable measure of the impact of each RRCBA on the (RCI) of each sample district. The method selected is similar to the one chosen for weighting RNCs to obtain a measure of need (NI). In this case, the total expenditures of all sample districts in each budget account (SEBA) was the unit of weight assigned to the appropriate RRCBA.

The process involved in computing a resource cost index (RCI) follows. First, the RRCBAs of the sample districts were multiplied by the appropriate SEBAs. Second, all (RRCBA) (SEBA) products for each sample district were summed. Third, this sum was divided by the total expenditures of all the sample districts for all budget accounts considered (TES). The operational definition of RCI is:

$$RCI = \frac{\Sigma(RRCBA)(SEBA)}{TES}$$

Illustration:

RCI (District #1) =

$$\frac{(.9000)(\$3,000)+(1.000)(\$7,000)+(1.1000)(\$20,000)}{\$30,000} = 1.0567$$

RCI (District #2) =

$$\frac{(1.0000)(\$3,000)+(1.5000)(\$7,000)+(1.000)(\$20,000)}{\$30,000} = 1.1167$$

RCI (District #3) =

$$\frac{(1.1000)(\$3,000)+(.5000)(\$7,000)+(.9000)(\$20,000)}{\$30,000} = .8267$$

Relative Financial Needs (RFN)

As defined in this study, the relative financial needs (RFN) of sample districts were considered to be indicated by their NI with appropriate adjustments made for variations in the costs of resources as indicated by the RCI of each district. This relationship is defined as:

$$RFN = (NI)(RCI)$$

Illustration:

RFN (District #1) = (.3375)(1.0567) = .3566

RFN (District #2) = (.9375)(1.1167) = 1.0469

RFN (District #3) = (1.7250)(.8267) = 1.4260

Equity Under the Adequate Program for Education in Georgia (APEG)

The operational definition of equity under APEG (EAPEG) was conceived as a measure of the extent APEG resulted in all pupils in the state having equal access to the resources necessary to support an adequate program of education. The process of calculating an index for EAPEG involved several sequential steps. First, the RFN of each sample district was multiplied by the mean appropriations to the sample

districts (MAS). Second, the absolute values of the difference between the (RFN)(MAS) products and the appropriations under APEG to each sample district (AD) were summed. Third, the resulting sum was divided by two times the total appropriations to the sample districts (TAS). (TAS was multiplied by two in order to be consistent with the operational definition of EAAPEG.) Fourth, the quotient obtained in step three was subtracted from the perfect EAPEG index of 1.00. The operational definition of EAPEG is:

$$EAPEG = 1.00 - \frac{\Sigma|(RFN)(MAS)-(AD)|}{2\ TAS}$$

Illustration:

EAPEG = 1.00 minus

$$\frac{|(.3566)(\$6,667)-(\$4,000)|}{(2)(\$20,000)}$$

$$+\ \frac{|(1.0469)(\$6,667)-(\$6,000)|}{(2)(\$20,000)}$$

$$+\ \frac{|(1.4260)(\$6,667)-(\$10,000)|}{(2)(\$20,000)}$$

EAPEG = 1.00 - .0773

EAPEG = .9227

Effect of Resource Cost Variations (ERCV)

The effect of resource cost variations on the equity of the distribution dimension of APEG was appraised by comparing the index of equity of allocations under APEG (EAAPEG) with the index of equity under APEG (EAPEG). Since EAPEG took into consideration resource cost variations and EAAPEG did not, then an estimate of the effect of resource cost variations (ERCV) on equality of educational opportunity was obtained by subtracting EAAPEG from EAPEG. The operational definition of ERCV is:

$$ERCV = EAPEG - EAAPEG$$

Illustration:

ERCV = .9227 - .9125

ERCV = .0102

Procedures

Strategies to implement the study of the impact of resource cost variations on equality of educational opportunities were based on relationships between data identified in the operational definitions. The schematic plan presented in Figure 2-2 shows these relationships. From the schematic plan strategies to arrive at measures of the extent the state plan reflects the relative financial needs of a sample of local school districts (EAPEG) and the effect of variations in the costs of resources on the equity of the distribution dimension of APEG (ERCV) were developed.

The relations among the necessary data are portrayed in the schematic plan. Since these data came from various sources in different locations within the state a structure for gathering the data was considered as facilitating the orderly completion of the study. The schematic plan formed the basis for the development of such a structure.

The specific categories of data which had to be collected, independent of other data, include:

(1) District Needs by Categories (DNC)

(2) Appropriations by Categories to Sample (ACS)

(3) District Resource Costs (DRC)

(4) Sample Expenditures by Budget Account (SEBA)

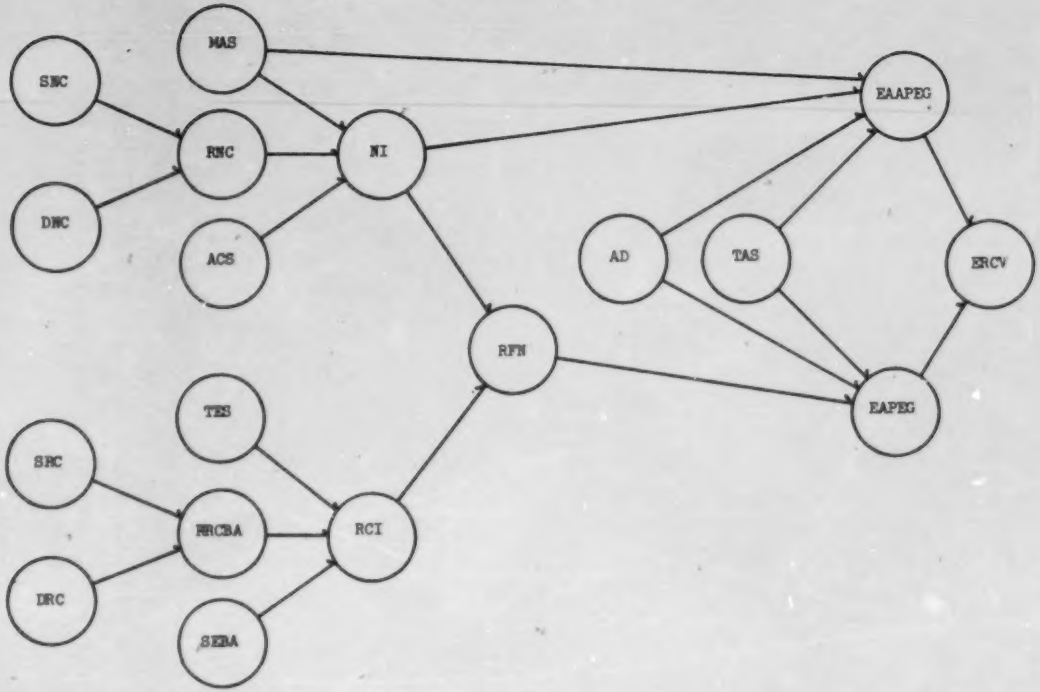
Items 1, 2, and 4 (DNC, ACS, and SEBA) were obtained from the records of the Georgia Department of Education for the 1975-76 fiscal year.

District Resource Costs (DRC) had to be obtained from each district included in the sample. Because the selection of the specific resources was critical to the validity and accountability of the study knowledgeable practitioners were asked to judge the appropriateness of items tentatively selected for study. The group of practitioners was identified by polling officers of the Georgia Association of School Business Officials and other informed individuals for nominations of competent persons to identify representative items of expenditure.

The Sample of Districts

Because data from all 188 local school districts would be difficult to obtain, only a small sample was included in this study. The rationale for the selection of the sample districts was based on several assumptions. The first assumption was that differences in the costs of resources associated with differences in the size of the student population

Figure 2-2. The schematic plan



served could be observed only if a wide range in the size of district student populations was included in the sample. A second assumption was that differences in the cost of resources among different geographic regions of the state could be observed only if a variety of geographic areas were included in the sample. The third assumption underlying the rationale was that differences in the costs of resources between county and independent (city) school systems could be observed only if both county and city systems are included in the sample. The final assumption was that this study would be more acceptable if the sample were representative of the larger school districts, in terms of student populations served (Figure 2-3 shows the distribution of students among county districts by average daily attendance).

The criteria for the selection of sample districts were:

(1) The sample must include county school districts within each congressional district.

(2) The sample must include county school districts within each quartile of size, as measured by average daily attendance (ADA).

(3) The sample must include both county and independent systems.

(4) The majority of the sample districts must be noncontiguous.

Based upon these criteria, the procedures used for selecting the sample districts are listed in sequence below.

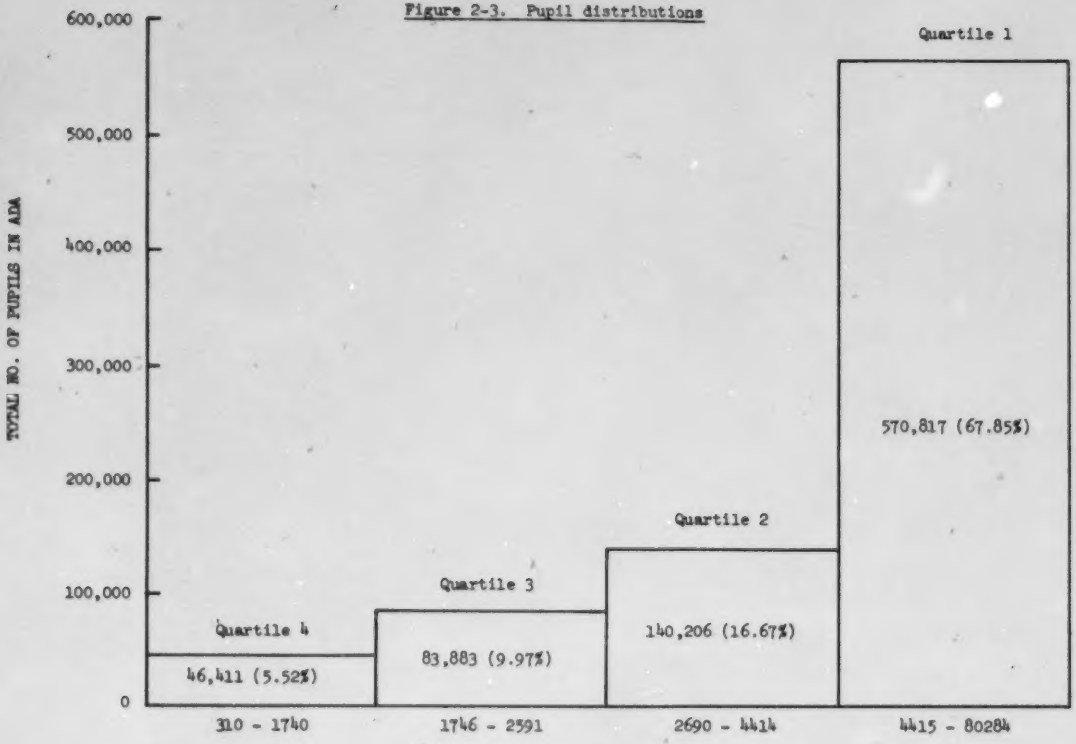
(1) All county school districts were listed according to average daily attendance (ADA) by quartile of ADA for each congressional district.

(2) The county school districts in the first quartile in ADA were numbered sequentially from largest to smallest within each congressional district.

(3) The county school district in the lower three quartiles in ADA were numbered sequentially from largest to smallest within each congressional district.

(4) One school district in the top quartile in ADA was selected from each congressional district (beginning with congressional district 1 and proceeding in numerical order through congressional district 10) by starting on row 41 column 5 of the Table of Random Digits on page 379 of The Design of Educational Experiments by C. Mitchell Dayton (New York: McGraw Hill Book Company, 1970).

Figure 2-3. Pupil distributions



(5) One school district was selected at random from the lower three quartiles in each of the congressional districts beginning with district 1 and proceeding in numerical order through congressional district 10 with the exception of congressional districts 4 and 5 which contain no county districts in the lower three quartiles of ADA.

(6) A third sample of noncontiguous districts was selected in the same manner as described in step 5 above.

Note: Independent districts were included in the samples if they were contiguous to or were contined within the county districts selected.

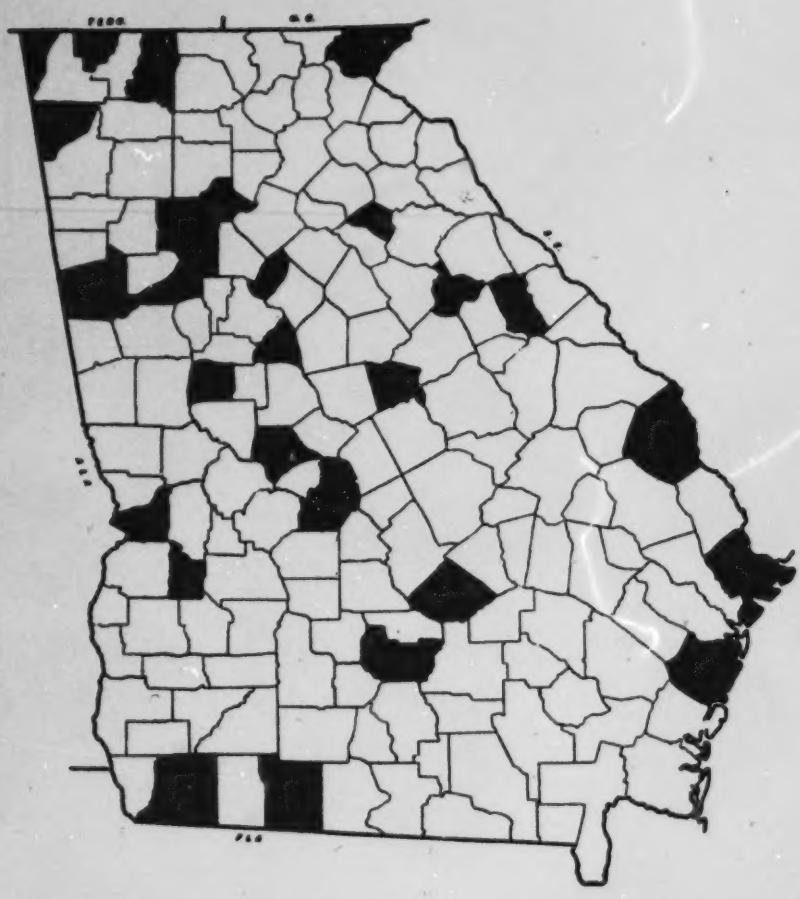
The sampling procedure described above resulted in the identification of the thirty-one school districts shown in Table I. The geographic locations of these districts are shown in Map I.

Table I - Sample districts

District Code	Congressional District	ADA	ADA Quartile
01	8	5,530	1
02	6	2,440	3
03	6	8,145	1
04	9	6,993	1
05	1	30,305	1
06	3	332	4
07	7	3,365	2
08	10	9,535	1
09	7	47,152	1
10	3	1,640	4
11	7	2,136	3
12	2	4,913	1
13	5	32,227	1
14	3	15,345	1
15	8	1,833	3
16	10	3,657	2
17	1	1,834	3
18	9	3,633	2
19	6	1,736	4
20	9	1,866	3
21	4	6,663	1
22	1	2,825	2
23	10	364	4
24	8	2,359	3
25	2	4,233	2
26	2	310	4
27*	5	72,921	
28*	6	2,638	
29*	7	4,199	
30*	2	3,661	
31*	7	925	

*City systems (all others are county systems).

Map I - Sample districts



CHAPTER THREE

EQUITY OF APPROPRIATIONS UNDER THE ADEQUATE PROGRAM FOR EDUCATION IN GEORGIA

Equity of appropriations under the Adequate Program for Education in Georgia (EAAPEG) is conceived as an estimate of the extent state appropriations plus required local effort are distributed to local school districts on the basis of the educational needs of pupils. With one exception, the operational definitions of needs in this study were derived from the basic data used by the Georgia Department of Education in determining the dollars to be distributed to local school districts. However, adjustments to these units of need made by the Georgia Department of Education were not taken into consideration. Neither does EAAPEG take into account any supplementary or enrichment funds generated solely at the discretion of local districts.

The measures of equity reported in this study are for the fiscal year beginning July 1, 1975 and ending June 30, 1976. Because the study was confined to this time period, equity measures are limited to this period and do not reflect changes made since June 30, 1976. The equity measures for each section of the APEG statutes studied are reported in the sections which follows.

Equity of Appropriations by APEG Section

The general procedure used for computing a measure of equity for each APEG section was as follows. First, each district's need for the category (DNC) was divided by the sum of the needs of all the sample districts (SNC) to arrive at a measure of the relative need of each district for the same category (RNC). Second, the sum of the state appropriations plus prorated required local effort for the APEG section was multiplied by the appropriate RNC. This step resulted in a dollar measure of relative need for each district under the APEG section. Third, these dollar measures were subtracted from the dollars disbursed under APEG (including required effort). The third step indicated the difference between the dollars of relative need for each district and the dollars received by each district for each APEG category. Fourth, the absolute values of these differences were divided by two times the total appropriations under the state plan (including required local effort). This process resulted in a decimal measure of inequity in appropriations under the state plan. Finally, the inequity measures were subtracted from the perfect appropriations equity index of 1.00. Thus, the resultant equity index is an estimate of the extent funds distributed under the appropriations

dimension of APEG were directly related to the educational needs of pupils served by the 31 sample districts.

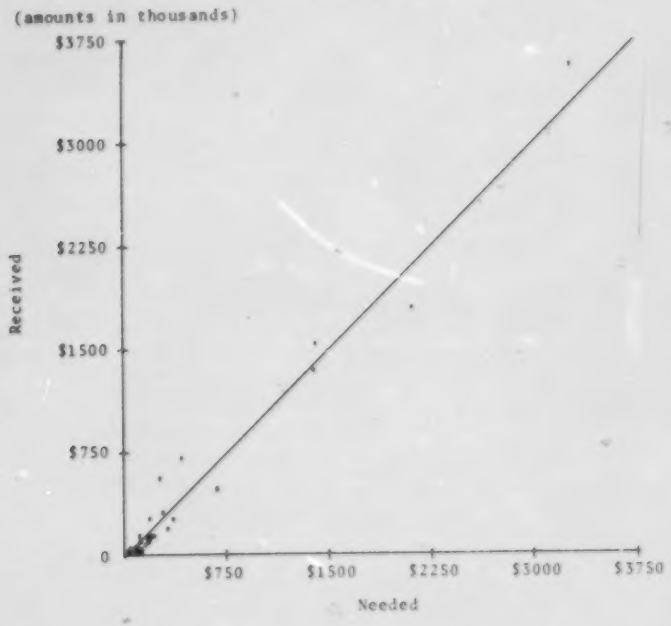
Special Education (32-605a)

The basic data used to compute the RNC for each sample district under APEG section 32-605a were:

> The first four (4) months of 1975-76 average enrollment in grades one (1) through twelve (12) plus exceptional children in self-contained classrooms.

Figure 3-1 shows the relationship between the dollars received and the dollars of relative need for each of the sample districts. When the general procedure for computing the appropriations equity index was applied to these data an index of .9042 resulted. In other words, about 90 percent of the funds distributed under APEG section 32-605a to the sample districts were in direct relation to the educational needs of the pupils served by the sample districts.

Figure 3-1. 32-605 Equity



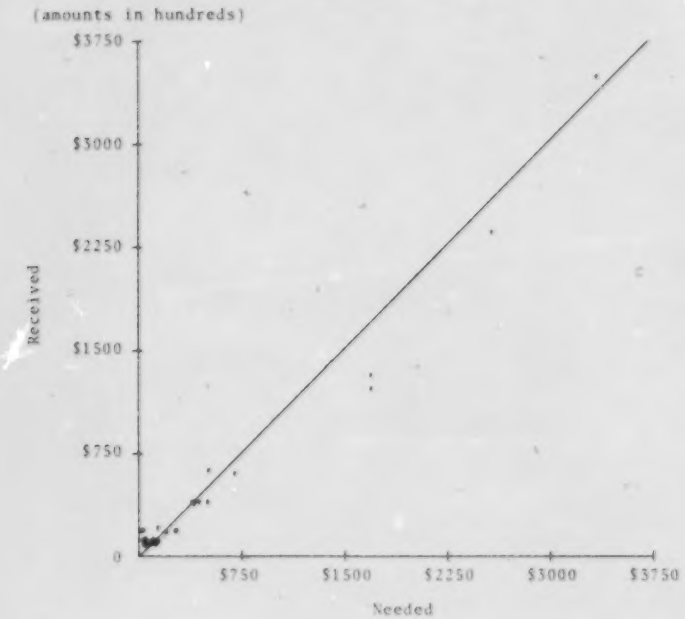
Preschool Education (32-607a)

The basic data for computing the RNCs of the sample districts under APEG section 32-607a were:

The average daily attendance for the first grade in 1975-76.

Figure 3-2 shows the relationship between the dollars of relative need and the dollars received for each of the sample districts. The general equity computational procedure produced an index of .8841 indicating that about 88 percent of the money distributed to the sample districts under APEG section 32-607a was in direct relation to the educational needs of pupils, as defined in the basic data used by the Georgia Department of Education.

Figure 3-2. 32-607 Equity



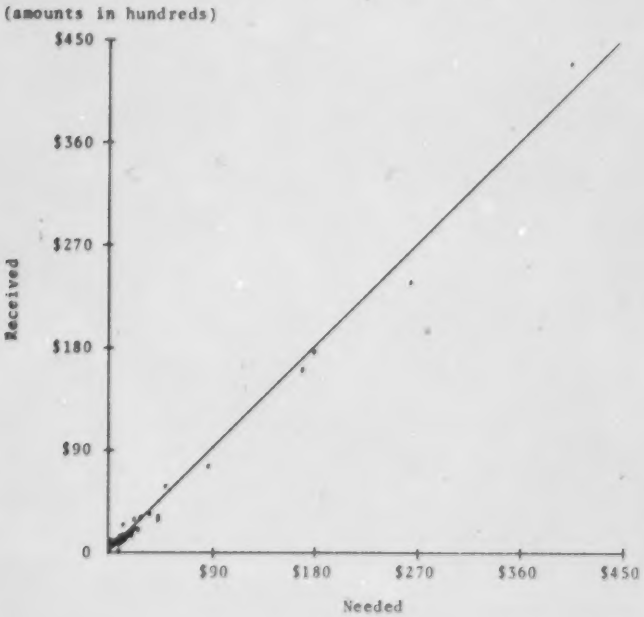
Establishment of Other Special Programs of Education; Allotment of Teachers and Other Personnel; Sharing of Costs (32-609a, f: Staff Development)

The units of need used in computing RNCs for APEG section 32-609a, f were derived from the basic data used in determining needs for APEG sections 32-605a; 32-610a, 1; 32-610a, 2; 32-620a; and 32-621a. These data were:

> The first four (4) months of 1975-76 average enrollment for grades one (1) through twelve (12) plus exceptional children in self-contained classrooms, the first four (4) months of 1975-76 average daily attendance in grades one (1) through twelve (12), and the first four (4) months of 1975-76 average daily attendance in grades seven (7) through twelve (12).

The units of need for each of the APEG sections used in computing the RNCs for APEG section 32-609a, f were weighted equally and averaged. The resulting equity index for this section of APEG was .9503. Figure 3-3 presents the relationships between the relative dollars needed and the dollars received by the sample districts.

Figure 3-3. 32-609 Equity



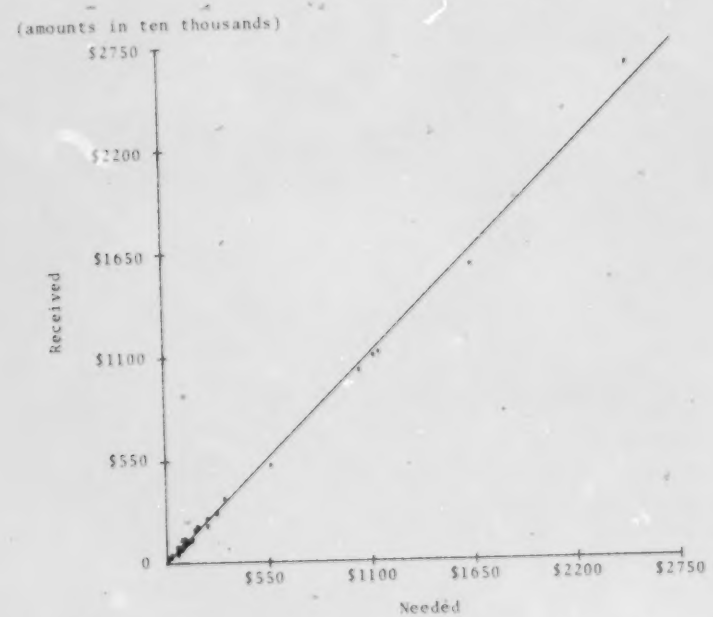
Allotment of Instruction Units: Amounts of Funds Needed for Payment of Salaries of Instructional Personnel (32-610a, 1, 2: General Education and Vocational Education).

The distribution of funds under APEG sections 32-610a, 1 and 32-610a, 2 were not accounted for separately by the Georgia Department of Education. Therefore, these two sections were combined to compute RNCs. The basic data used in these computations were:

> The first four (4) months of 1975-76 average daily attendance in grades one (1) through twelve (12) and the first four (4) months of 1975-76 average daily attendance in grades seven (7) through twelve (12).

The units of need for these two categories were weighted equally and averaged. Figure 3-4 shows the relationship between relative dollars needed and dollars received by the sample districts. When the general procedure for computing the equity of appropriations was applied, an index of .9807 was obtained. This index indicates that approximately 98 percent of the funds distributed to the sample districts under APEG sections 32-610a, 1, 2 were in direct relation to the educational needs of the pupils served by the sample districts.

Figure 3-4. 32-610 Equity



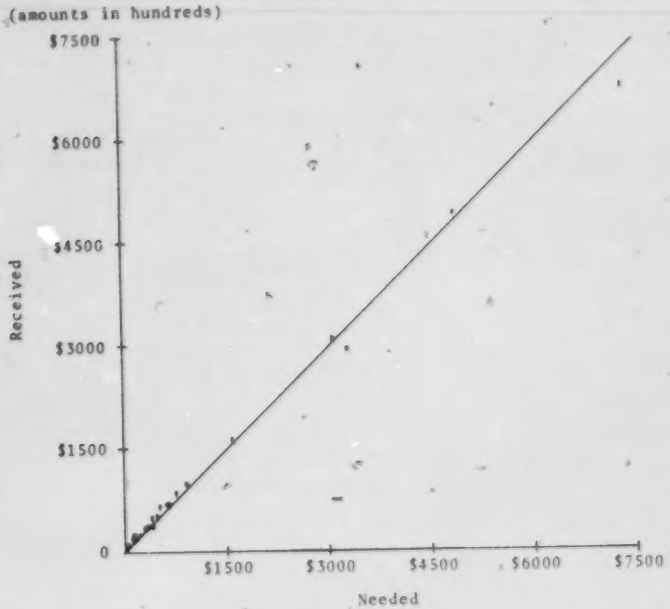
Instructional Media (32-613a)

The basic data used in computing RNCs for APEG section 32-613a were derived from the basic data used in determining needs for APEG sections 32-605a and 32-610a, 1, 2. These data were:

> The first four (4) months of 1975-76 average enrollment in grades one (1) through twelve (12) plus exceptional children in self-contained classrooms, the first four (4) months of 1975-76 average daily attendance in grades one (1) through twelve (12), and the first four (4) months of 1975-76 average daily attendance in grades seven (7) through tewlve (12).

Application of the general procedure for computing equity of appropriations resulted in an index of .9693 indicating nearly 97 percent of the dollars distributed to the sample districts under APEG section 32-613a were in direct relation to needs, as determined by the basic data used by the Georgia Department of Education. Figure 3-5 shows this relationship.

Figure 3-5. 32-613 Equity



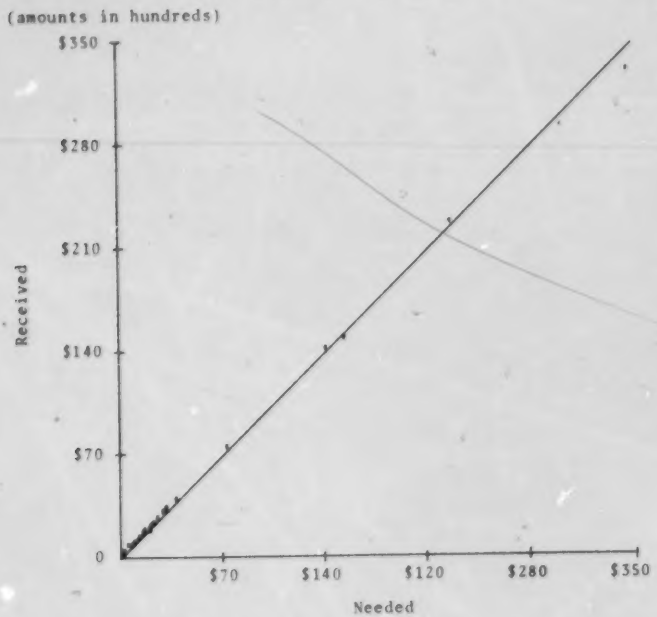
Instructional Equipment (32-614a)

The basic data for computing RNCs for APEG section 32-614a were:

The first four (4) months of 1975-76 average daily attendance in grades one (1) through twelve (12) plus exceptional children in self-contained classrooms.

Figure 3-6 presents the relationships between the relative dollars needed and the dollars received for the 31 sample districts. The equity index computed for APEG section 32-614a (.9865) indicates more than 98 percent of the dollars distributed to the sample districts under this section of APEG were in direct relation to educational needs, as defined in the basic data used by the Georgia Department of Education.

Figure 3-6. 32-614 Equity



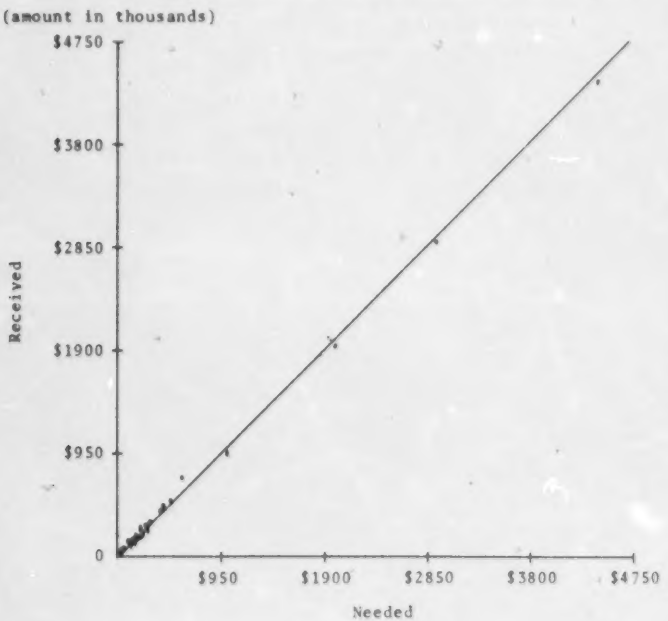
Amount of Funds Needed for Payment of Maintenance and Operation (32-615a)

The basic data used in computing RNCs for APEG section 32-615a were the same as for APEG section 32-613a. These data were:

> The first four (4) months of 1975-76 average enrollment in grades one (1) through twelve (12) plus exceptional children in self-contained classrooms, the first four (4) months of 1975-76 average daily attendance in grades one (1) through twelve (12), and the first four (4) months of 1975-76 average daily attendance in grades seven (7) through twelve (12).

The units of need for each of the APEG sections used in computing the RNCs for APEG section 32-615a were weighted equally and averaged. When the general procedure for computing the equity of appropriations index was applied to these data an index of .9850 was obtained. This index indicates about 98.5 percent of the funds distributed to the sample districts under APEG section 32-615a were in direct relation to educational needs, as defined by the basic data used by the Georgia Department of Education. Figure 3-7 shows the relationships between dollars needed and dollars received by the sample districts.

Figure 3-7. 32-615 Equity



62

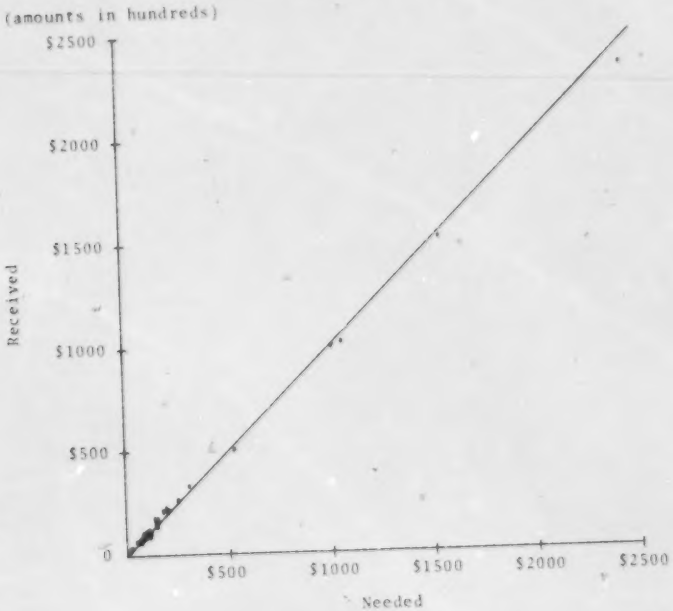
Amount of Funds Needed for Payment of Sick and Personal Leave Expenses (32-616a)

The basic data used in computing RNCs for this section of APEG were the same as those used for sections 32-613a and 32-615a. These data were:

> The first four (4) months of 1975-76 average enrollment in grades one (1) through twelve (12) plus exceptional children in self-contained classrooms, the first four (4) months of 1975-76 average daily attendance in grades one (1) through twelve (12), and the first four (4) months of 1975-76 average daily attendance in grades seven (7) through twelve (12).

These need measures were weighted equally and averaged to compute RNCs for this section of APEG. The equity index for APEG section 32-616a was .9850. Figure 3-8 shows relationships between the relative needs of sample districts and the funds they received under APEG section 32-616a.

Figure 3-8. 32-616 Equity



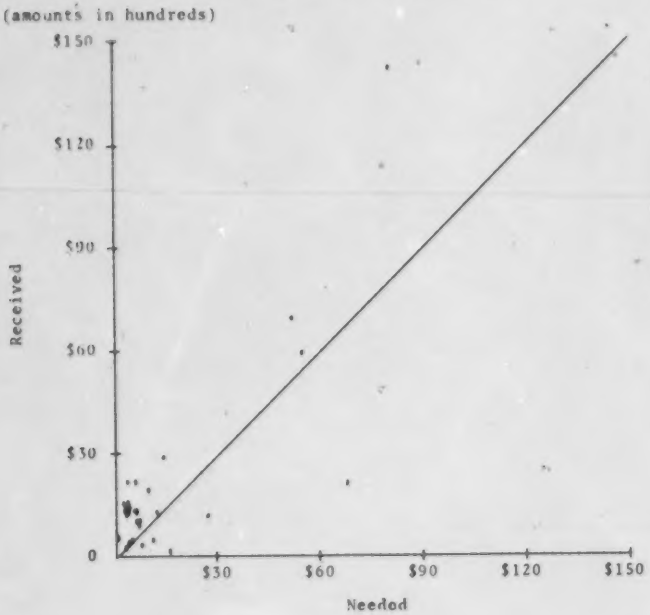
Amount of Money Needed for Travel Expenses (32-617a)

The basic data used in computing RNCs for APEG section 32-617a were the same as those used for APEG section 32-614a. These data were:

> The first four (4) months of 1975-76 average daily attendance in grades one (1) through twelve (12) plus exceptional children in self-contained classrooms.

When the general procedure for computing equity was applied to those data an index of .6182 was obtained. Figure 3-9 shows the relationship between the relative dollars needed and the dollars received by the sample districts.

Figure 3-9. 32-617 Equity



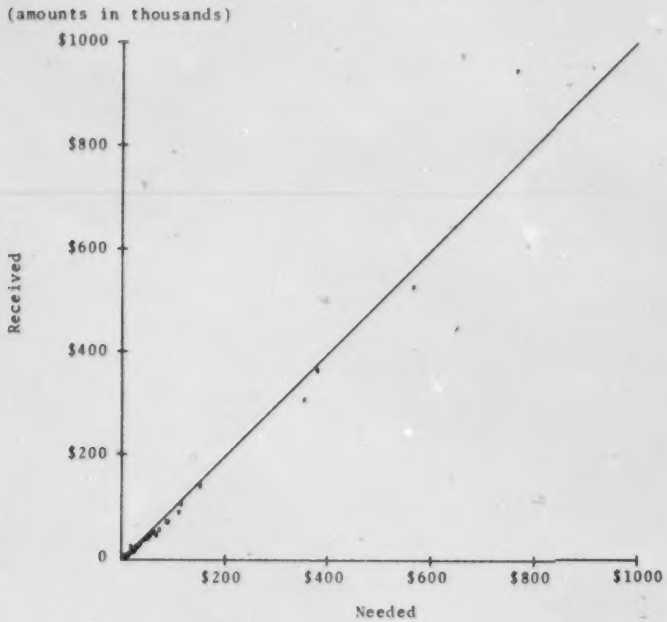
Amount of Funds Needed for Compensatory Education Expenditures (32-618a)

The relative needs for compensatory education funds were computed from the following data:

The annual average daily attendance in grades one (1) through four (4) for 1975-76.

Application of the general procedure for computing equity of appropriations resulted in an index of .9435 indicating about 94 percent of the dollars distributed to the sample districts under APEG section 32-618a were in direct relation to needs, as defined by the basic data used by the Georgia Department of Education. Figure 3-10 shows this relationship.

Figure 3-10. 32-618 Equity



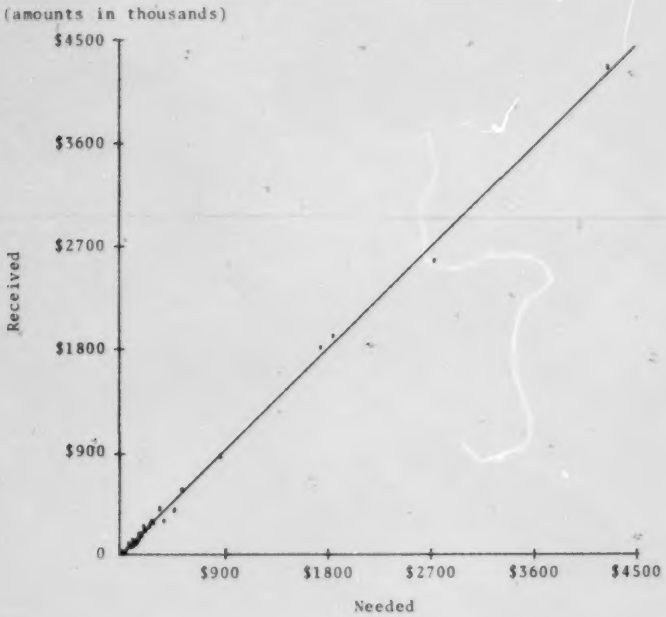
Student Services Support Personnel and Administration and Supervisory Services (32-620a, 621a)

The distribution of funds under APEG section 32-620a and 32-621a were not accounted for separately. Therefore, these two sections were combined to compute RNCs. The basic data used in these computations were:

The first four (4) months of 1975-76 average daily attendance for grades one (1) through twelve (12) plus exceptional children in self-contained classrooms.

Figure 3-11 shows the relationship between the relative dollars needed and the dollars received by the sample districts. The equity index for these sections of APEG is .9801.

Figure 3-11. 32-620, 621 Equity



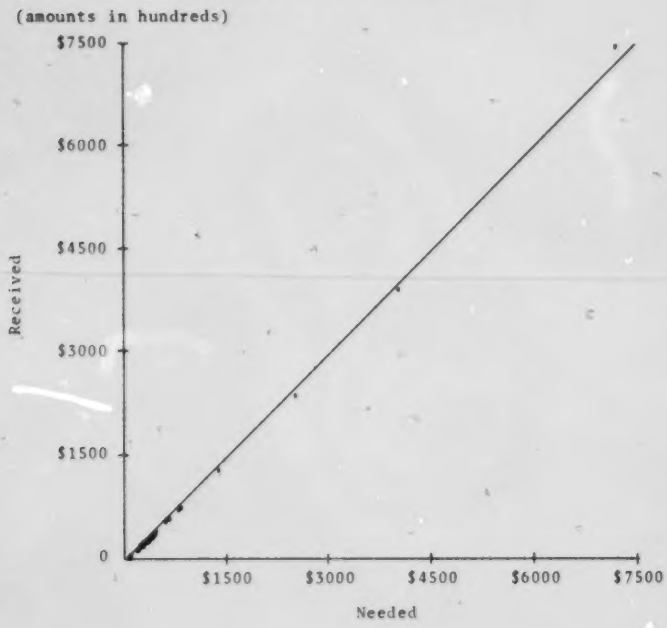
Food Services (32-622a)

Funds distributed for food services were limited to a flat rate per reimbursable pupil lunch. Therefore, the basic data used to compute RNCs were:

The number of reimbursable pupil lunches served.

Figure 3-12 shows the high degree of equity under this section of APEG. Perfect equity, 1.0000 instead of an equity index of .9901, would have resulted if required local effort had not been taken into consideration in the computation of the equity measure.

Figure 3-12. 32-622 Equity



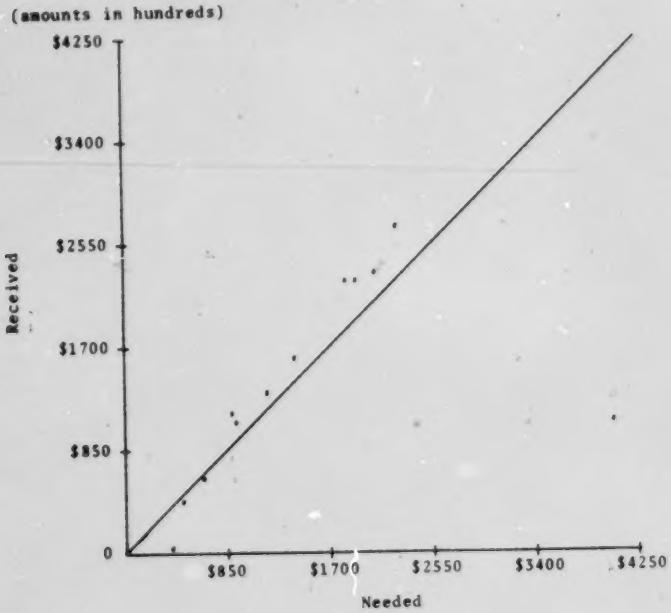
Transportation (32-625a)

The units of need used by the Georgia Department of Education for APEG section 32-625a were based upon surveys conducted on site and could not be translated into an alternative quantifiable form. Therefore, the basic data used in computing RNCs for transportation were:

> The number of state approved transportation units for sample districts which had local transportation surveys conducted in 1974-75 or 1975-76.

An equity index of .8380 indicates nearly 84 percent of the funds distributed to the sample districts under APEG section 32-625a were in direct relation to the needs of pupils served by the sample districts. (Note; the index did not take into consideration geographic cost differentials used by the Georgia Department of Education). Figure 3-13 shows the relationship between the relative dollars needed and the dollars received by the sample districts.

Figure 3-13. 32-625 Equity



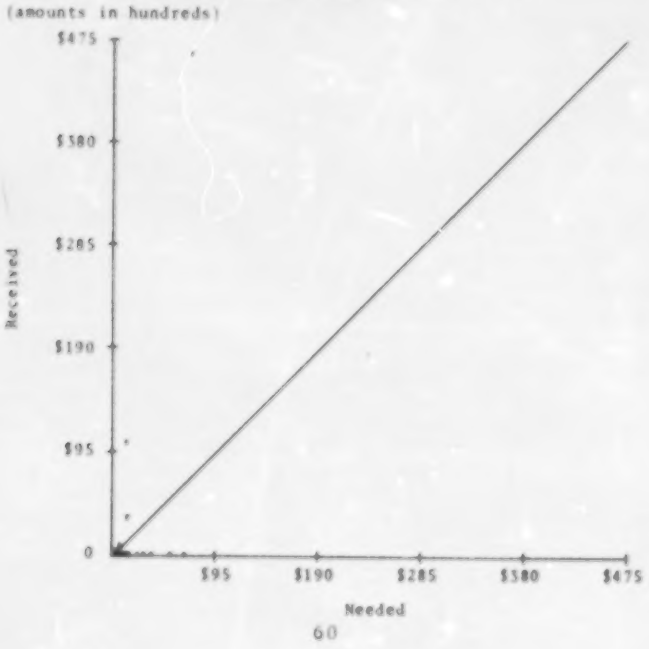
Allotments of Capital Outlay Funds; Rules, Regulations, Etc. (32-648a)

December 1, 1974, the Georgia Department of Education published a report entitled "Survey of School Plant Needs." In this report the total estimated cost to replace obsolete facilities, renovate facilities, modernize facilities, and to construct new facilities for each local district were presented. Using this report as a base, the data used in computing RNCs were:

> The total estimated cost for facilities presented by the Georgia Department of Education on December 1, 1974 minus the funds distributed to the sample districts for capital outlay from December 1, 1974 through June 30, 1975.

The equity index of .1695 found for APEG section 32-648a is low. Undoubtedly, a higher index would have been found if this study had covered more than one fiscal year. Figure 3-14 presents the relationships between the relative dollars needed by the sample districts and the dollars received by these districts. (Note: required local effort was not included in the computations for this section of APEG because the state specifies other criteria in order to qualify for capital outlay funds.)

Figure 3-14. 32-648 Equity

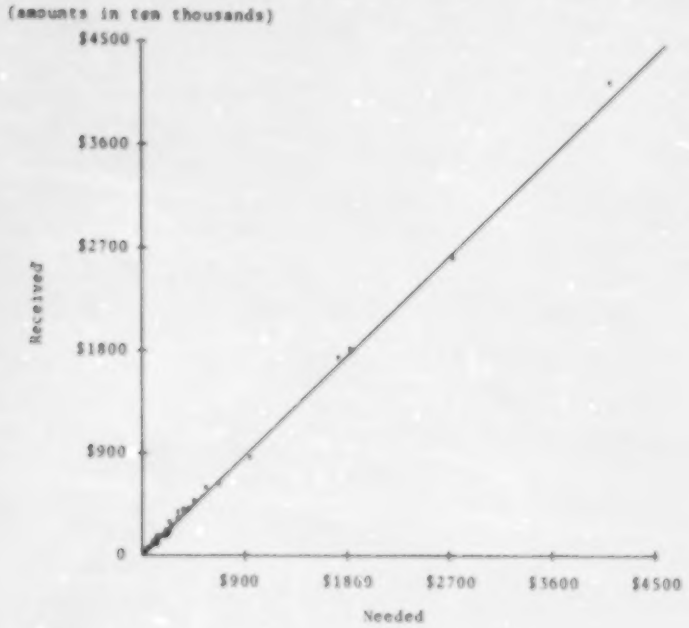


APEG Appropriations Equity

Using the procedures identified in Chapter Two - The Study Design and Procedures, the equity of appropriations under the Adequate Program for Education in Georgia (EAAPEG) was calculated. The resulting index of .97183 indicates 97.183 percent of the total funds distributed to the sample districts under all sections of APEG were in direct relation to the needs of the pupils served by the sample districts. The equity index shown here did not take into consideration any adjustments made by the Georgia Department of Education to the basic data. (For example; APEG section 32-610 funds were adjusted by the state on the basis of training and experience of teachers actually employed under this section, whereas this adjustment was not considered in this study). In view of this, the equity index of .97183 is remarkably high.

Figure 3-15 shows the relationships between the measures of relative need and the dollars received by the sample districts under APEG.

Figure 3-15. APEG appropriations equity



CHAPTER FOUR

THE EFFECT OF RESOURCE COST VARIATIONS

A major thrust of contemporary school finance research is directed toward identifying satisfactory methods of measuring and compensating for differences in the costs of resources to deliver equivalent educational programs. Although most studies focus on salaries, 29 resource categories (including salaries) were investigated in this study. Amending allocation procedures to compensate for differences in the cost of resources without consideration of the methods used to distribute funds may operate to increase inequities rather than to move toward greater equality of educational opportunity. For this reason, interactions between the procedures for distributing funds under the state plan and resource cost variations were also considered.

Relative Resource Costs by Budget Accounts

Because all expenditures of local school systems were classified according to the directions issued by the Georgia Department of Education, these expenditure classifications were used as a basis for selecting the resources investigated in this study. The final specifications for the 29 resources selected were based upon the following assumptions:

1. The resources were of equivalent quality in each of the sample districts.

2. The costs of the resources varied among the sample districts.

3. The resources were representative of expenditures in each of the budget accounts.

4. The unit costs of the resources could be obtained from district records or from vendors serving the sample districts.

The specifications used, and expenditure differentials found, are reported in the sections which follow. The distribution of relative resource costs are also displayed for each budget account. In these displays the average daily attendances of the sample districts are used on the horizonal axis in order to provide a familiar and consistent reference.

Account Number 053 - Salary of Administrative Assistant

In determining a specification for budget account number 053, the assumption was made that the combined efforts of all personnel charged to this account were equivalent among the sample school districts. Larger districts tend to employ more specialized personnel under this account than small districts, but personnel in smaller districts may perform a broader range of services. Therefore, the specification used was:

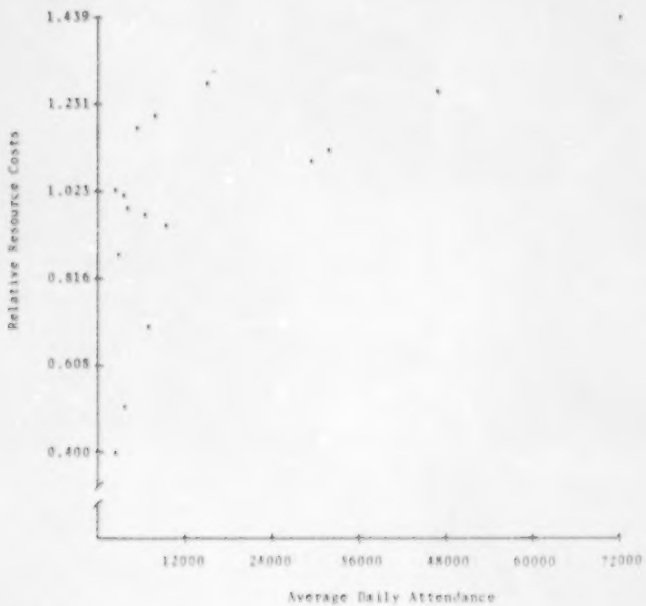
> The mean monthly salary of all district level administrative personnel charged to this account.

Descriptive Statistics:

Mean $1,558.468 Standard Deviation $420.825
Range $1,618.010 Number of Cases 16

The distribution of expenditures, in terms of relative resource costs for account number 053, by average daily attendance of the sample districts, are shown in Figure 4-1.

Figure 4-1. Account 053 costs



Account Number 054 - Salary of Clerical Employees

Because of an anticipated wide range in qualifications of personnel employed under this account the specification used was one of minimal qualifications. The specification selected was:

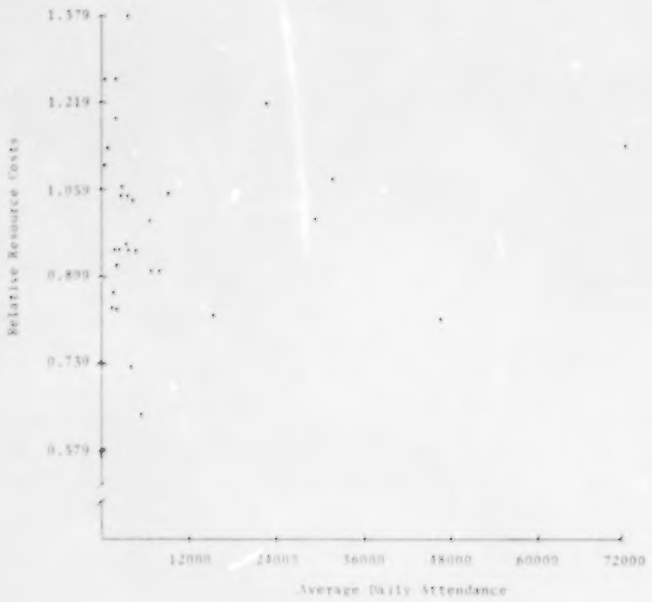
> The monthly salary of a beginning full-time secretary assigned to the district office based upon the secretary holding a high school diploma or equivalent and having no previous job-related experience.

Descriptive Statistics:

Mean $474.923 Standard Deviation $77.992
Range $380.000 Number of Cases 31

Figure 4-2 presents the distribution of relative resource costs for account number 054 by the average daily attendance of the sample districts.

Figure 4-2. Account 054 costs



Account Number 058 - Travel of Superintendent

Although several district superintendents were furnished automobiles for professional travel, most districts made provisions for reimbursing the superintendent for travel in their personal automobiles. The specification used for this account number was:

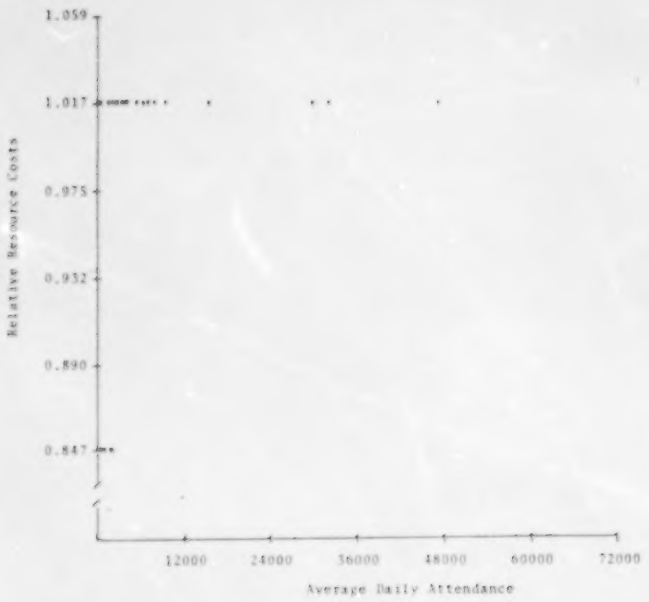
> The reimbursement rate per mile for travel of the Superintendent by personal automobile.

Descriptive Statistics:

Mean $.118 Standard Deviation $.007
Range $.025 Number of Cases 24

As Figure 4-3 illustrates, most districts reimbursed their superintendents at the same rate per mile for travel. However, there were differences among the sample districts.

Figure 4-3. Account 058 costs



Account Number 063 - Other Administrative Expenses

Account number 063 encompassed a wide range of expenditure items. The resource considered most likely to be consistent with the assumptions presented earlier was bond paper. The specification selected was:

> The price per ream for the first purchase in the 1975-76 year for number 4 grade twenty (20) pound 8 1/2" x 11" bond paper delivered to the district.

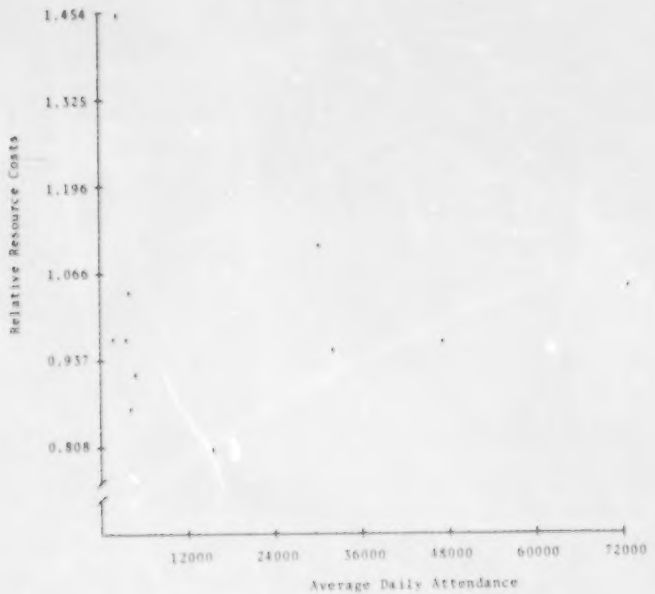
Because prices vary considerably between grades of paper purchases were verified as to grade through telephone conversations with the vendors involved.

Descriptive Statistics:

Mean $1.424 Standard Deviation $.242
Range $ .920 Number of Cases 11

The relative prices paid for bond paper are presented in Figure 4-4.

Figure 4-4. Account 063 costs



Account Number 068 - Salary of Principals

Because most Georgia principals are compensated on the basis of training and experience with adjustments made for the number of teachers serving in the school, a determination was made to control for differences among districts for these variable factors in the resource specification selected. This specification was:

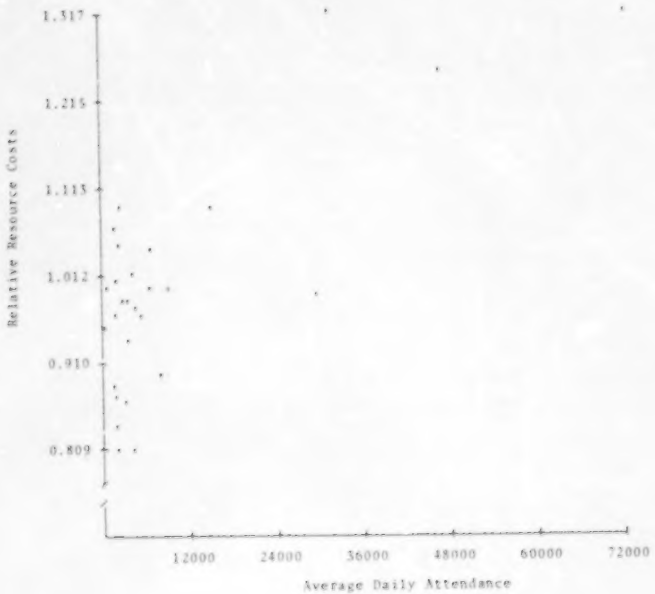
> The monthly salary of a principal in a school with twenty-five (25) teachers based upon the principal holding a master's level certificate and having five (5) years of school experience.

Descriptive Statistics:

Mean $1286.031 Standard Deviation $167.193
Range $ 655.040 Number of Cases 28

Figure 4-5 presents the distribution of relative resource costs for account 068 by average daily attendance of the sample districts.

Figure 4-5. Account 068 costs



Account Number 069 - Salary of System-Wide Supervisors

The titles assigned to personnel charged to account 069 varied considerably among the sample districts and distinctions among the responsibilities associated with the numerous titles were impossible to make. Therefore, a judgment was made that the highest level personnel charged to account 069 in each sample district with adjustments made for training and experience would provide for the best comparability among districts. The specification for account number 069 was:

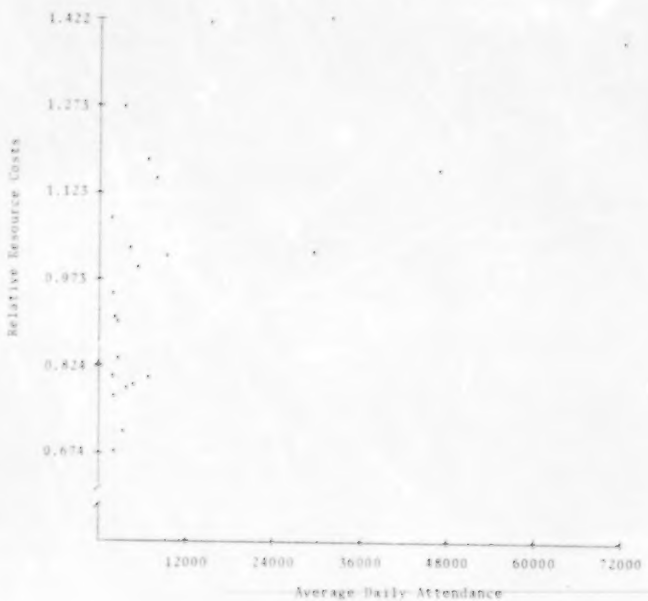
> The monthly salary of the supervisor of instruction with the broadest area of responsibility based upon the supervisor holding a master's level certificate and having five (5) years of school experience.

Descriptive Statistics:

Mean $1318.327 Standard Deviation $302.018
Range $ 986.420 Number of Cases 23

The distribution of salaries, in terms of relative resource costs, by average daily attendance of the sample districts is presented in Figure 4-6.

Figure 4-6. Account 069 costs



Account Number 070 - Salary of Classroom Teachers

In selecting the specification for the salary of classroom teachers a judgment was made that minimal qualifications for teachers would provide an acceptable basis for comparison with adequate control for quality differences. The specification used for classroom teachers' salary was:

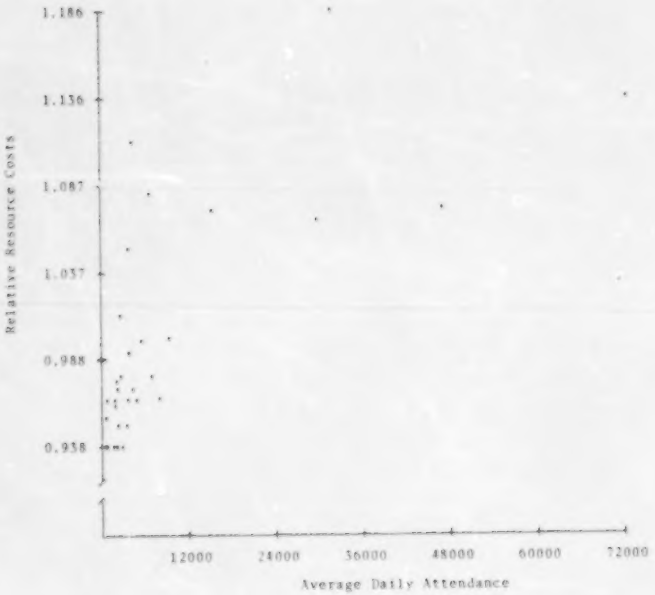
> The annual salary of a regular classroom teacher based upon the teacher holding a bachelor's level certificate and having no creditable experience.

Descriptive Statistics:

Mean $7439.160 Standard Deviation $485.917
Range $1841.000 Number of Cases 31

Figure 4-7 presents the distribution of relative beginning teachers' salaries by average daily attendance of the sample districts.

Figure 4-7. Account 070 costs



Account Number 071 - Salary of Teacher Aides

The Georgia Department of Education established minimum standards for teacher aides. Basically, these standards were possession of a high school diploma or equivalent and a prescribed number of hours of preservice training. Those meeting these standards were identified as Rank I teacher aides. Based upon these standards the specification used in this study was:

> The monthly salary of a Rank I teacher aide with no creditable experience.

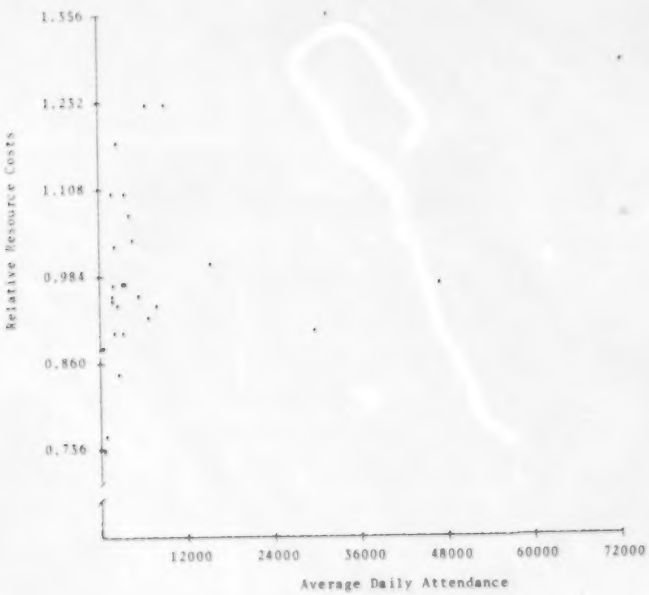
In those districts where aides were compensated at an hourly wage a monthly salary was derived by converting hours worked to a equivalent fraction of a 160 hour work-month.

Descriptive Statistics:

Mean $339.879 Standard Deviation $49.806
Range $211.000 Number of Cases 29

The distribution of relative teacher aide salaries are presented in Figure 4-8.

Figure 4-8. Account 071 costs



Account Number 072 - Salary of Paraprofessionals

As was the case for teacher-aides, the Georgia Department of Education also established minimum standards for paraprofessionals identified as Rank II paraprofessionals. The specification used for comparing paraprofessionals' salaries was:

> The monthly salary of a Rank II paraprofessional with no creditable experience.

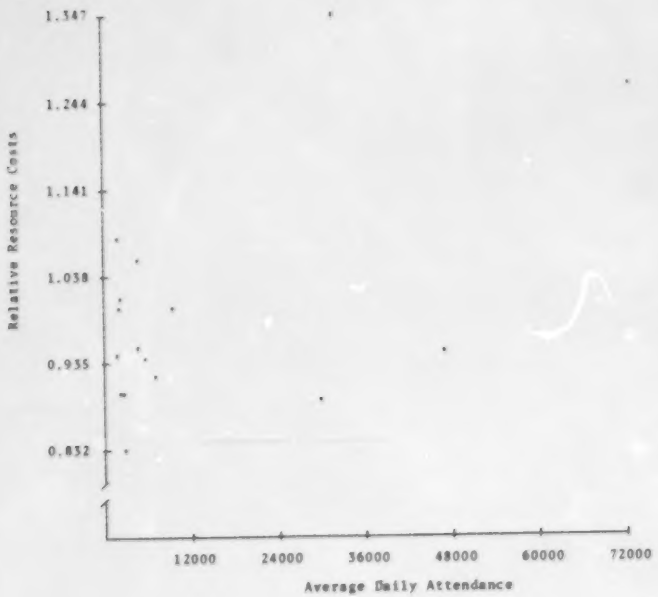
The monthly salaries of those paraprofessionals paid on an hourly basis were derived in the same manner as for teacher-aides .

Descriptive Statistics:

Mean $379.995 Standard Deviations $51.684
Range $196.000 Number of Cases 16

The distribution of relative paraprofessional salaries are shown in Figure 4-9.

Figure 4-9. Account 072 costs



Account Number -74 - Salary of School Librarians

The specification selected for comparing salaries of school librarians was based upon qualifications considered representative of beginning librarians. This specification was:

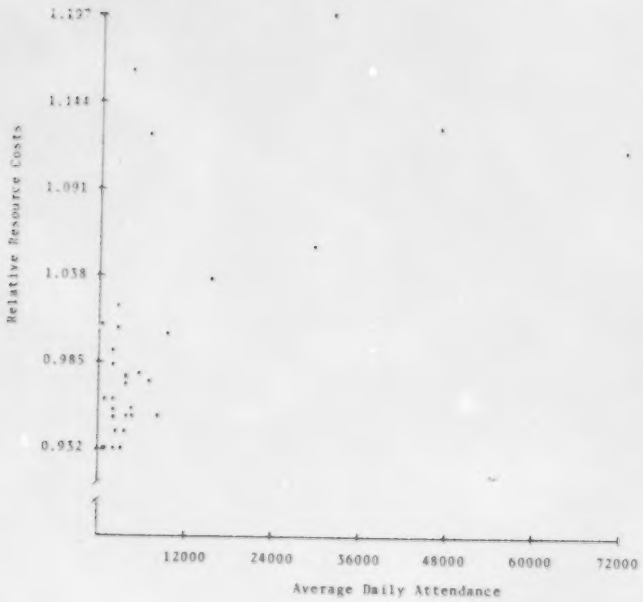
> The monthly salary of a "career library media specialist" holding a master's level certificate and having five (5) years of school experience.

Descriptive Statistics:

Mean $958.675 Standard Deviation $96.717
Range $253.900 Number of Cases 31

Figure 4-10 illustrates the dispersion of the relative salaries of librarians among the sample districts.

Figure 4-10. Account 074 costs



Account Number 077 - Salary of Secretarial or Clerical Employees in Principals Office

A wide range in qualifications of personnel charged to this account was anticipated. In order to get comparable data minimal qualifications were used in the specification for this account. The specification used was:

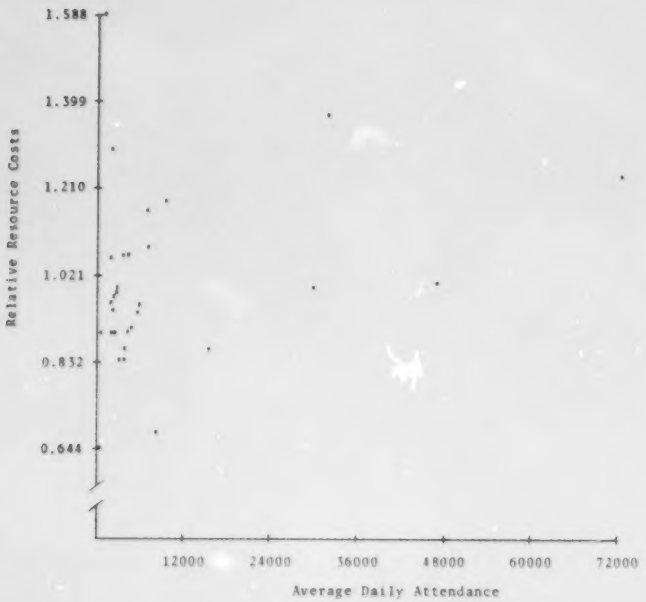
> The monthly salary of a beginning full-time secretary assigned to a school principal's office based upon the secretary holding a high school diploma or equivalent and having no previous job-related experience.

Descriptive Statistics:

Mean $388.517 Standard Deviation $75.735
Range $367.000 Number of Cases 30

Figure 4-11 presents the distribution of relative secretarial salaries by average daily attendance of the sample districts.

Figure 4-11. Account 077 costs



Account Number 079 - Salary of Substitute Instructional Personnel

The specification chosen for personnel charged to account 079 was based upon minimal acceptable qualifications. Although some districts employed more substitute teachers with qualifications exceeding those specified, all districts in the sample made provision for compensating substitutes based on the qualifications specified. The specification used for this account number was:

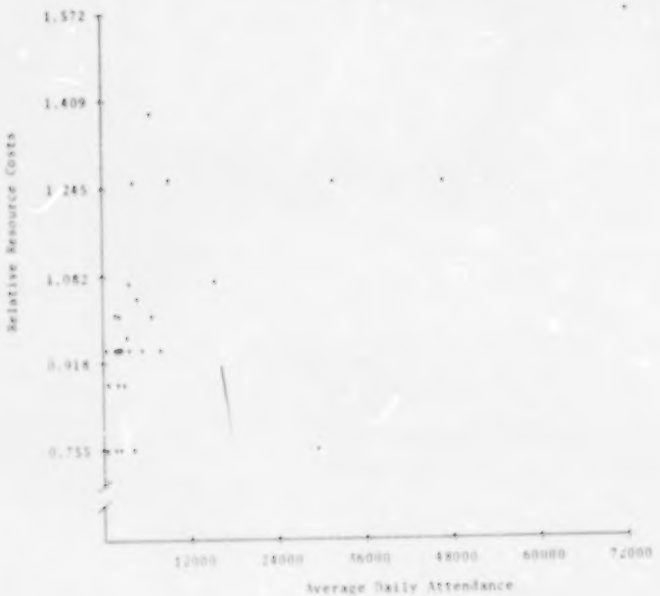
> The daily rate of compensation for a substitute teacher holding a high school diploma or equivalent and having no creditable experience.

Descriptive Statistics:

Mean $15.900 Standard Deviation $3.084
Range $13.000 Number of Cases 31

The distribution of relative substitute teachers' salaries is shown in Figure 4-12.

Figure 4-12. Account 079 costs



Account Number 082 - Periodicals and Newspapers

To compare differences in the costs for resources charged to this account among the sample districts, a specification was prepared in an attempt to focus on locally produced resources. This specification was:

> The monthly subscription rate for the newspaper of largest daily circulation printed within the district.

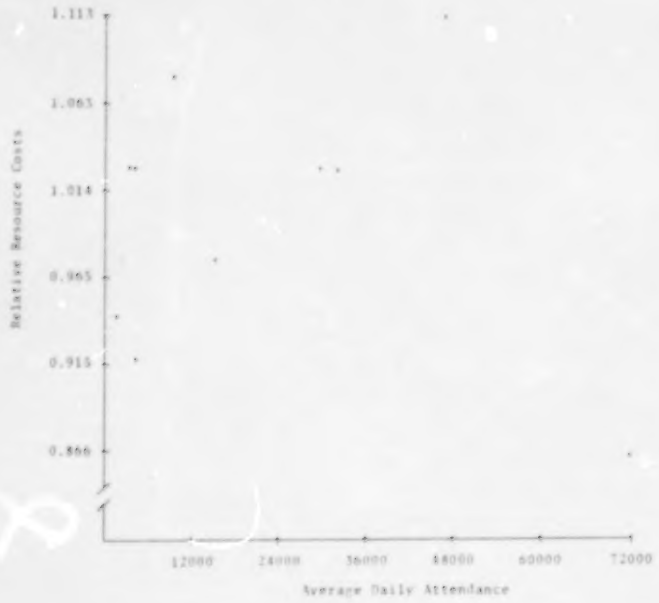
Daily newspapers were not printed within some districts. In other districts, newspapers were purchased by individual schools and not accounted for in the districts' records.

Descriptive Statistics:

Mean $2.921 Standard Deviation $.219
Range $ .720 Number of Cases 10

Figure 4-13 presents the distribution of relative newspaper costs among the sample districts.

Figure 4-13. Account 082 costs



Account Number 085 - Teaching Supplies

The resources charged to account number 085 encompassed a wide range. The resource considered most likely to be consistent with the assumptions presented earlier was spirit duplicator paper. The specification for spirit duplicator paper was:

> The price per ream for the first purchase in the 1976 fiscal year for number 4 grade twenty (20) pound 8 1/2" x 11" spirit duplicator paper delivered to the district.

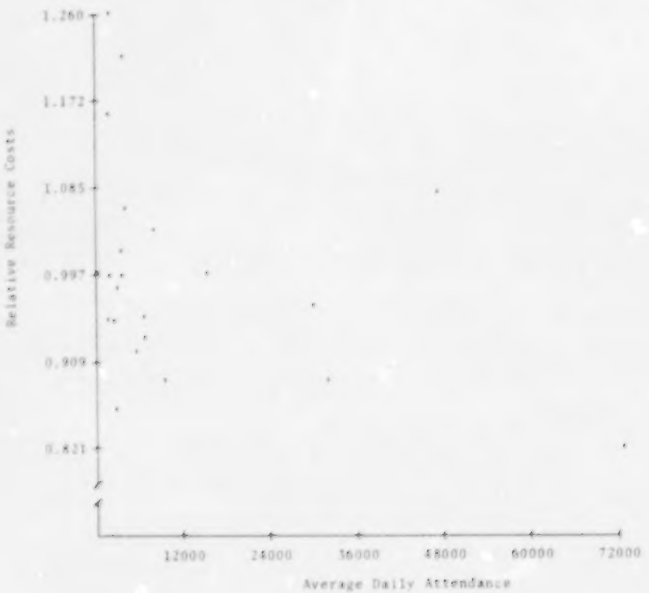
Because prices vary considerably between grades of paper, purchases were verified as to grade through telephone conversations with the vendors involved.

Descriptive Statistics:

Mean $1.389 Standard Deviation $.149
Range $ .611 Number of Cases 22

The distribution of relative prices paid for spirit duplicator paper is shown in Figure 4-14.

Figure 4-14. Account 085 costs



Account Number 089 - Travel of Regular Programs Instructional Expense

Reimbursement for the expense of operating a personal automobile was selected as the resource cost item representative of account number 089. The specification for this account was:

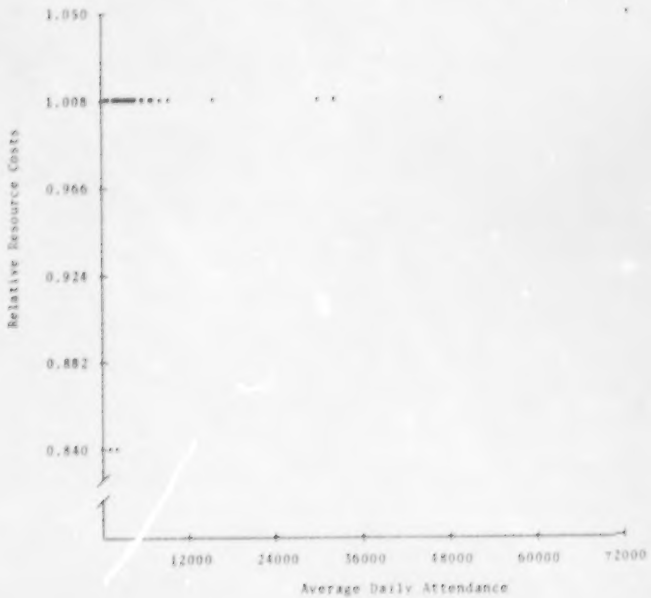
> The reimbursement rate per mile for travel by personal automobile by instructional personnel.

Descriptive Statistics:

Mean $.119 Standard Deviation $.005
Range $.025 Number of Cases 31

Figure 4-15 presents the relative rates paid for travel of instructional personnel.

Figure 4-15. Account 089 costs



Account Number 101 - Salary of Visiting Teachers

The Georgia Department of Education established standards for the certification of personnel employed as visiting teachers. Based on these standards the specification selected for visiting teachers' salaries was:

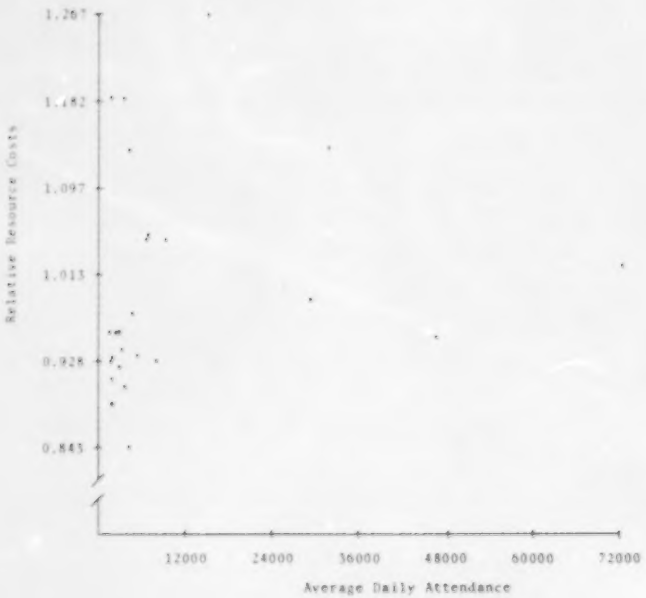
> The monthly salary of a visiting teacher based upon the teacher holding a master's level certificate and having three (3) years of school experience.

Descriptive Statistics:

Mean $1100.537 Standard Deviation $118.223
Range $ 466.650 Number of Cases 25

Relative salaries paid to visiting teachers are displayed in Figure 4-16.

Figure 4-16. Account 101 costs



Account Number 105 - Travel of Attendance Service Personnel

Reimbursement for the expense of operating a personal automobile was selected as the item of expenditure representative of account number 105. This specification was:

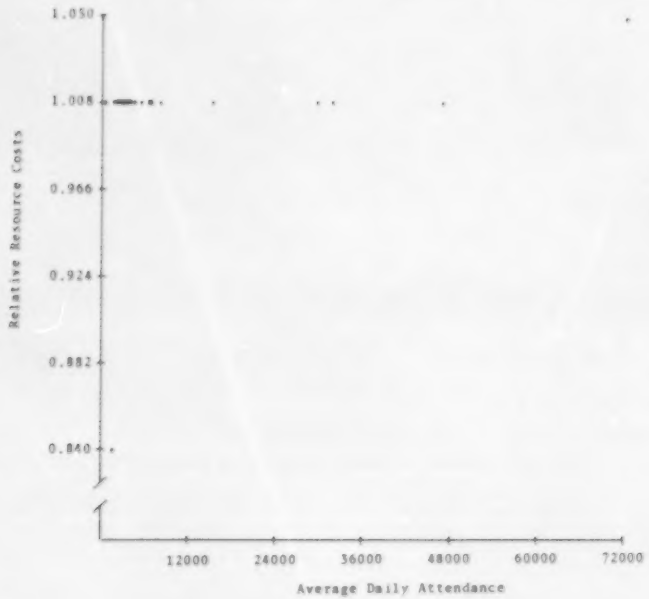
> The reimbursement rate per mile for travel by personal automobile by a visiting teacher.

Descriptive Statistics:

Mean $.119 Standard Deviation $.004
Range $.025 Number of Cases 23

Figure 4-17 presents the relative rates paid for travel of visiting teachers.

Figure 4-17. Account 105 costs



Account Number 110 - Salary Pupil Transportation Service Drivers

Numerous methods of compensating school bus drivers were anticipated. However, the following specification was interpreted with a high degree of consistency by personnel in the sample districts;

> The annual salary of a beginning bus driver on a regular run based upon the driver holding a state license and having no creditable experience.

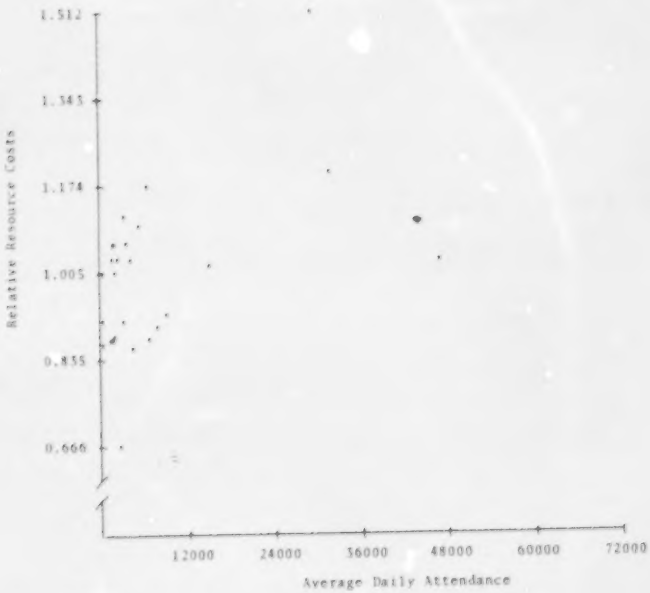
In one case, the salaries of drivers were adjusted for number of miles driven. For the purposes of this study, salaries in this district were converted using the district average for the number of miles driven.

Descriptive Statistics:

Mean $2746.500 Standard Deviation $431.413
Range $2323.000 Number of Cases 26

The relative salaries paid to bus drivers are illustrated in Figure 4-18.

Figure 4-18. Account 110 costs



Account Number 111 - Salary of Pupil Transportation Service Maintenance and Garage Employees

The salary of a bus mechanic was selected as the expenditure item most representative of this account number. Because of the lack of a consistent definition of a bus mechanic among the sample districts, interviews were conducted to insure that the salary reported was, in fact, for a mechanic and not a mechanic's helper. The specification used for this account was:

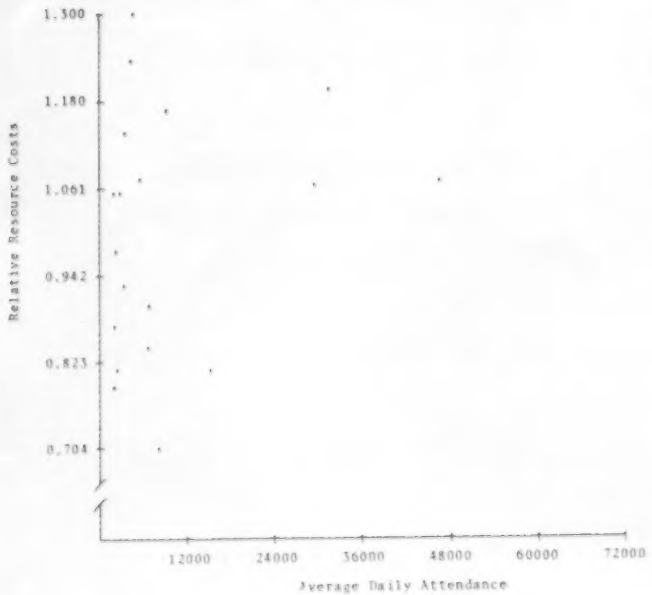
> The monthly salary of a beginning bus mechanic with job entry skills based upon previous job-related experience, but with no compensation granted for previous experience.

Descriptive Statistics:

Mean $615.616 Standard Deviation $103.964
Range $366.670 Number of Cases 19

Figure 4-19 presents the relative beginning salaries paid to bus mechanics.

Figure 4-19. Account 111 costs



Account Number 113 - Salary of Substitute Pupil Transportation Service Personnel

The salary paid to a substitute bus driver was the expenditure item chosen for comparison among the sampled districts. As was the case for salaries of bus drivers, a high degree of consistency was found in the interpretation of the following specification:

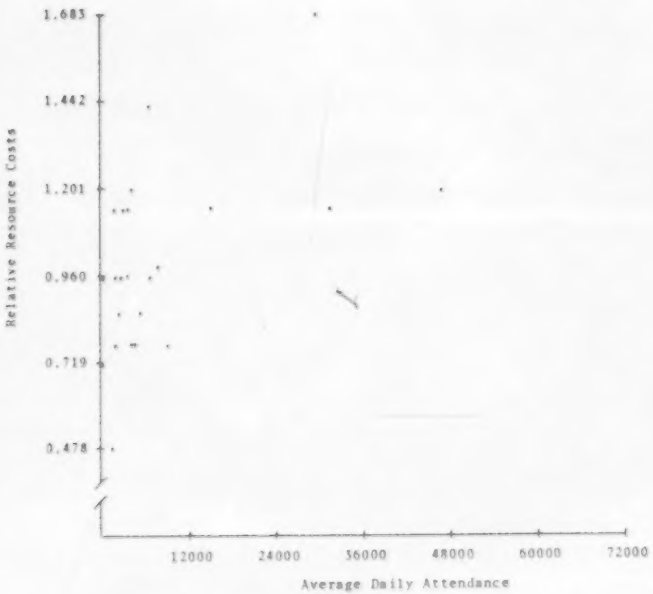
> The daily rate of compensation of a beginning substitute bus driver on a regular run based upon the driver holding a state license and having no creditable experience.

Descriptive Statistics:

Mean $10.456 Standard Deviation $2.501
Range $12.600 Number of Cases 27

The relative salaries paid to substitute bus drivers are displayed in Figure 4-20.

Figure 4-20. Account 113 costs



Account Number 115 and 182 - Pupil Transportation Vehicles

Purchases of school buses were accounted for under two account numbers in the Georgia Department of Education prescribed Annual Financial Report. In this study, the two account numbers were consolidated. Because specifications for school buses were prepared by the Georgia Department of Education and the 66 passenger bus was the size most commonly purchased, these criteria were incorporated into the specification for this expenditure item. This specification was:

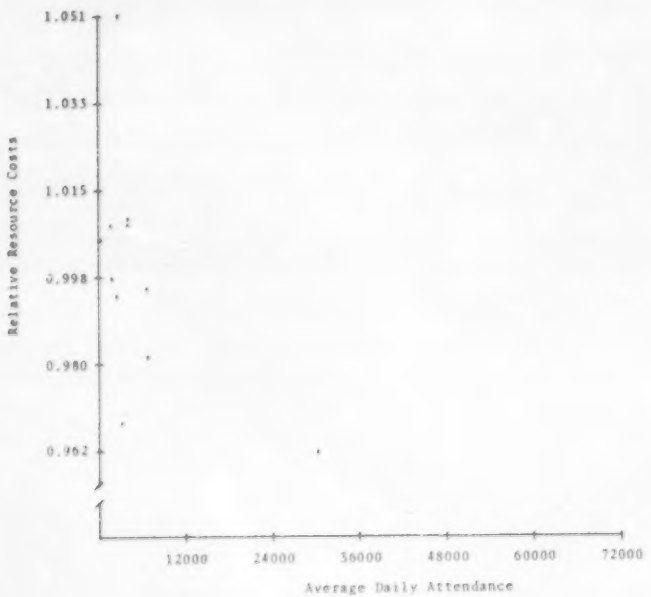
> The unit cost for the first purchase in the 1976 fiscal year of conventional sixty-six (66) passenger school buses meeting state specifications with no additional specifications stated and buses delivered to the district.

Descriptive Statistics:

Mean $14,037.988 Standard Deviation $344.599
Range $ 1,251.598 Number of Cases 11

Figure 4-21 presents the relative prices paid for school buses meeting the specification.

Figure 4-21. Accounts 115 and 182 costs



Account Number 117 - Pupil Transportation Service Insurance

Because a wide range in coverage was anticipated for bus liability insurance the manager of the "Insurance Services Office of Georgia" was contracted to obtain appropriate rate conversion tables. Using these conversion tables the following specification was applied to those sample districts where sufficient data could be obtained:

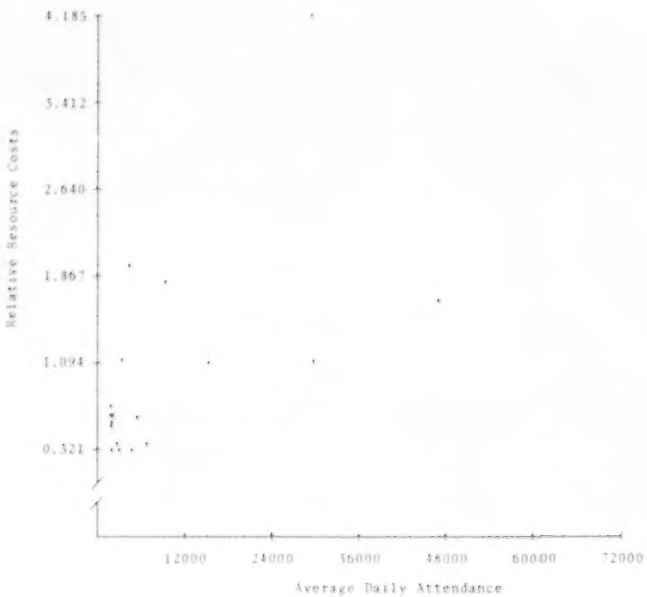
> The annual invoiced premium rate for $25,000-$50,000-$25,000 of liability insurance coverage per sixty-six (66) passenger school bus.

Descriptive Statistics:

Mean $ 89.159 Standard Deviation $83.218
Range $344.510 Number of Cases 18

As Figure 4-22 illustrates, the range of prices paid for equivalent bus liability insurance was remarkable.

Figure 4-22. Account 117 costs



Account Number 119 - Other Expenses for Pupil Transportation Services

Gasoline was the item of expenditure selected for cost comparisons among the sample districts for account number 119. The specification for this resource was:

> The price per gallon of regular gasoline for the last purchase prior to January of 1976.

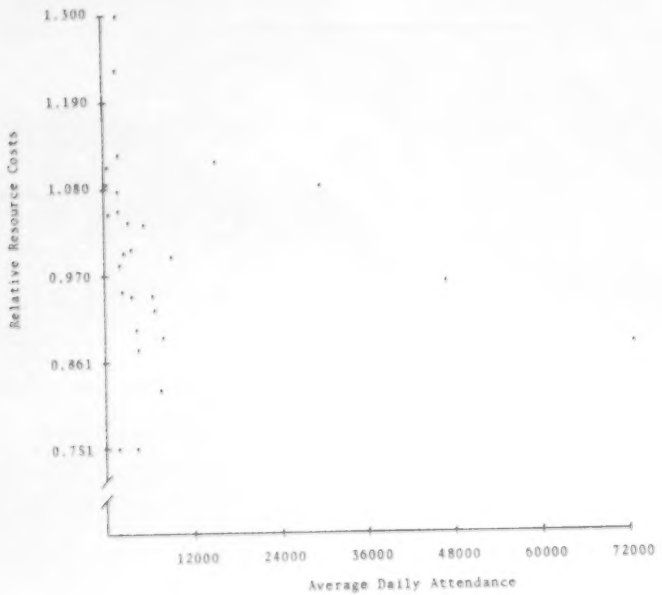
Two districts purchased only high test grade gasoline. Telephone conversations with vendors indicated the price differential between regular grade and high test was approximately three cents per gallon. Therefore, the gasoline prices for these two districts were reduced by three cents and included in the analysis.

Descriptive Statistics:

Mean $.423 Standard Deviation $.052
Range $.232 Number of Cases 28

The distribution of relative gasoline prices are presented in Figure 4-23.

Figure 4-23. Account 119 costs



Account Number 124 - Salary of M & O Personnel

The expenditure item selected for study under this account number was custodial salaries. Because employment qualifications for these personnel were nebulous, minimal accepted training and experience were specified. The specification for account number 124 was:

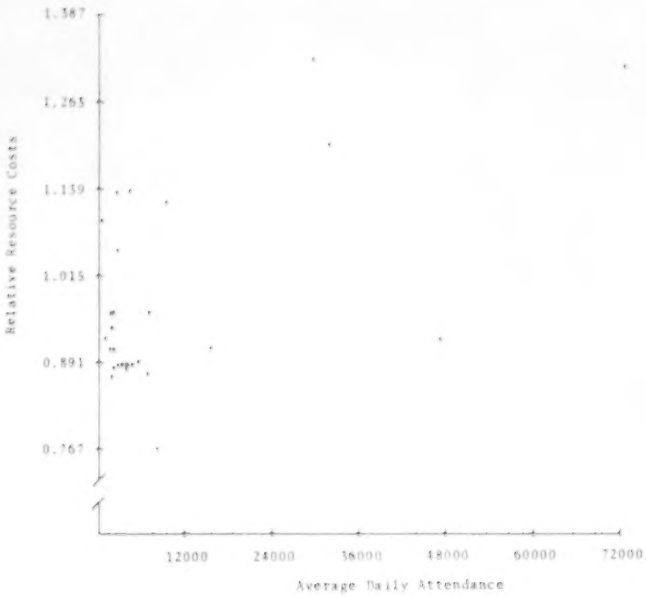
> The monthly salary of a beginning full-time custodian with minimal acceptable qualifications and no salary credit given for previous training or experience.

Descriptive Statistics:

Mean $396.494 Standard Deviation $59.967
Range $246.000 Number of Cases 30

Figure 4-24 presents the distribution of relative salaries paid to beginning custodians.

Figure 4-24. Account 124 costs



Account Number 128 - Maintenance of Equipment

The only expenditure item considered to have sufficient usage for meaningful comparisons was maintenance of typewriters. The specification used was:

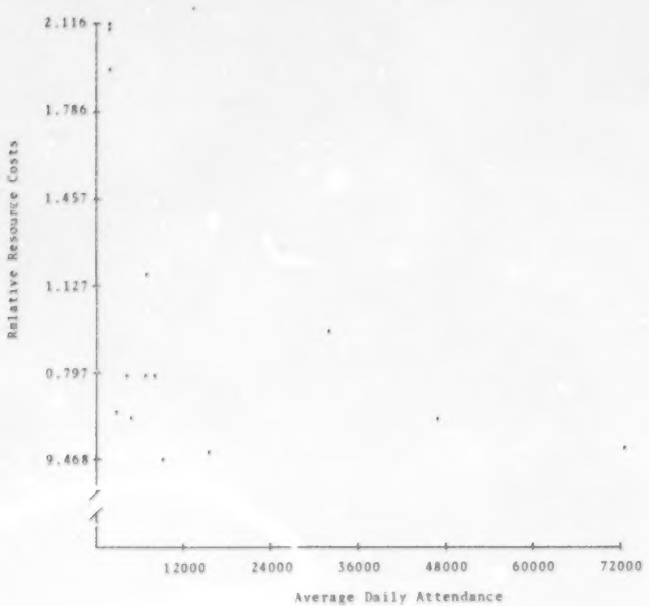
> The annual service contract price per manual typewriter with yearly routine servicing, repair service of breakdowns available upon call, and the cost of parts excluded from the contract price.

Descriptive Statistics:

Mean $19.243 Standard Deviation $11.573
Range $31.720 Number of Cases 14

As Figure 4-25 shows, there was a wide range in prices paid for typewriter maintenance service.

Figure 4-25. Account 128 costs



Account Number 130 - Power, Water, and Natural Gas

Because of increasing concern for rising energy costs the precision of the specification for expenditures in this account was especially critical. A judgment was made that electrical costs would be most representative of all expenditures in this account. Thus, the specifications used for account number 130 was:

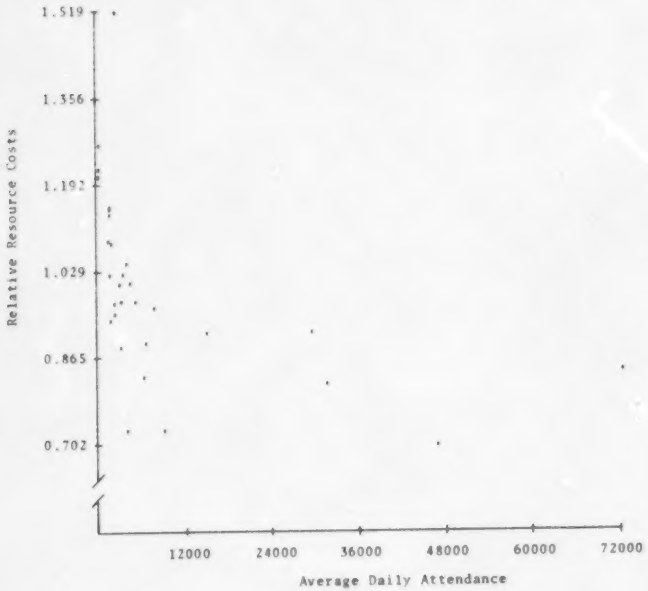
> The mean cost per kilowatt hour of electricity for bills paid during September 1975, January 1976, and May 1976.

Descriptive Statistics:

Mean $.0439 Standard Deviation $.0077
Range $.0359 Number of Cases 30

The relative prices paid per kilowatt hour of electricity are presented in Figure 4-26.

Figure 4-26. Account 130 costs



Account Number 131 - Telephone

The assumptions were made that most of the sampled districts would have at least one private line telephone and direct comparisons could be made between the basic rates charged for these lines. The specification used for this comparison was:

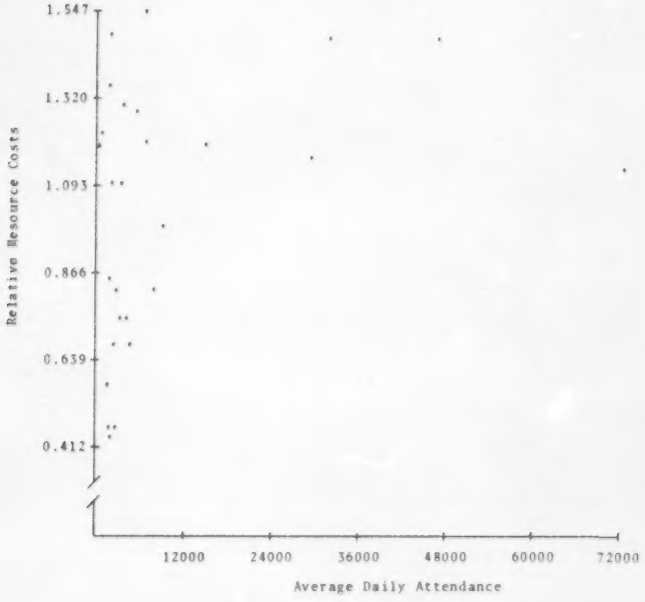
> The monthly cost for a private line telephone with no extensions and long distance call charges excluded.

Descriptive Statistics:

Mean $18.197 Standard Deviation $6.422
Range $20.650 Number of Cases 28

Figure 4-27 illustrates the dispersion of relative rates for private line telephones.

Figure 4-27. Account 131 costs



Account Number 132- Custodial Supplies

The item of expenditure selected for account number 132 was paper towels. Because of variations in the number of towels per package and differences in the size of sheets, these factors were considered in the selection of the specification for account 132. This specification was:

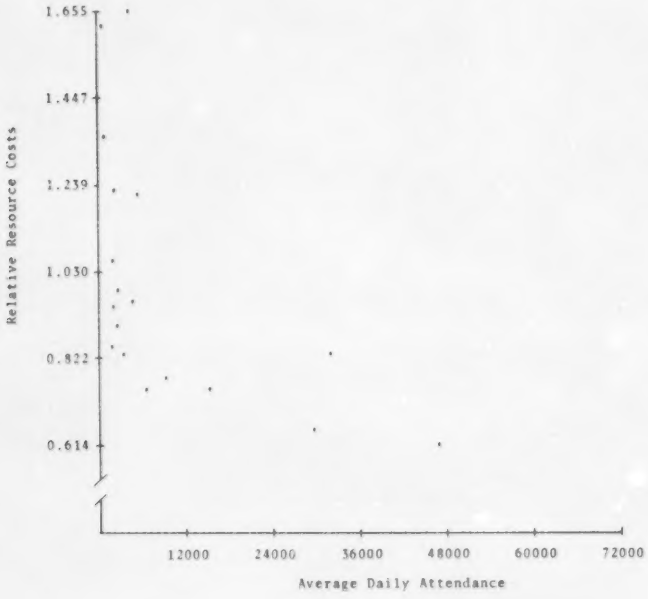
> The per towel cost for the first purchase of the 1976 fiscal year for 9 3/8" x 10 3/4" or accepted equivalent twenty-six (26) pound, single ply, single fold paper towels delivered to the district.

Descriptive Statistics:

Mean $.002143 Standard Deviation $.000651
Range $.002232 Number of Cases 18

The relative prices paid for paper towels are presented in Figure 4-28.

Figure 4-28. Account 132 costs



Account Number 155 - Liability Insurance, Bond Premiums

Workman compensation insurance rates were selected for study under budget account number 155. Because of a wide variety of methods used in computing charges for school districts the decision was made to base comparisons on invoiced rates with adjustments made only for experience modifications and discounts offered by vendors. The specification used was:

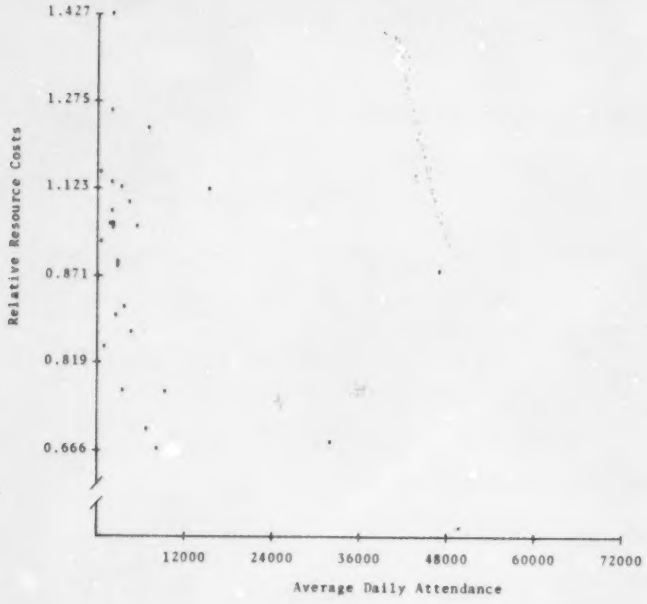
> The invoiced rate for workman's compensation insurance per $100 of remuneration for professional and clerical employees.

Descriptive Statistics:

Mean $.1535 Standard Deviation $.0287
Range $.1168 Number of Cases 26

Figure 4-29 presents the relative rates charged for workman's conpensation insurance.

Figure 4-29. Account 155 Costs

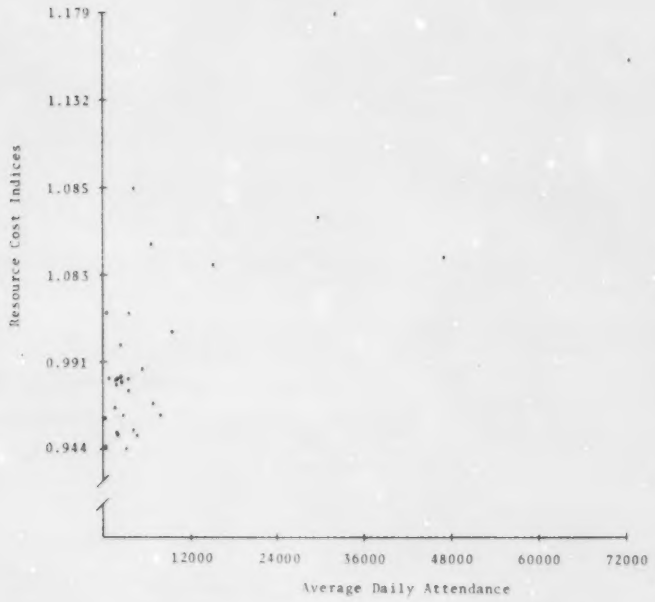


Resource Cost Indices

The relative resource costs by budget accounts (RRCBA) reported in the preceding pages were used to arrive at a cumulative resource cost index (RCI) for each of the sample districts. Each RRCBA was weighted to reflect its proportionate influence on the total expenditures of the sample districts. Sample districts with missing data for individual budget account categories were excluded from the computations involving those RRCBAs. This process resulted in RCIs for individual districts representing only those budget categories where no data were missing.

Figure 4-30 presents the cumulative resource cost indicies of the sample districts.

Figure 4-30. Resource cost indicies



Effect of Cost Differences

The equity of appropriations under the Adequate Program for Education in Georgia (EAAPEG) indicated approximately 97 percent of the funds distributed under the state plan were in direct relation to the needs of the sample districts. When the procedures described in Chapter Two were applied to the resource cost data an index of equity under APEG (EAPEG) of .941906 was obtained. This EAPEG index indicates that when differences in the cost of resources, as expressed in resources cost indices, are taken into consideration approximately 94 percent of the funds distributed under the state plan were in direct relation to the relative financial needs (RFN) of the sample districts.

Although resource cost indices for the sample districts ranged from a low of .944 to a high of 1.179, the effect of resource cost variations (ERCV) on the equity of the distribution dimension of APEG was less than three percent. In other words, the spread of 23.5 percent differences in resource cost variations only lowered equity of appropriations from .97183 to .94191. The effect of resource cost variations (ERCV) on the equity of appropriations under APEG was estimated to be: .94191 - . 97183 = - . 02992 or 2.992 percent.

CHAPTER FIVE

POLICY IMPLICATIONS

Two questions should be considered in discussions of amendments to the state plan to compensate for differences in the costs of educational resources. The first question is: Do differences in the costs of educational resources have enough effect on equality of educational opportunity to justify amending the state distribution procedures? If the response to this question is negative, then the second question is of little importance. However, if the decision is made to attempt to change the state plan to compensate for differences in the costs of resources, then the second question should be addressed -- Can policy decisions be made which effectively compensate for the impact of resource cost differentials on equality of educational opportunity?

The cost of equivalent educational resources in the highest cost district was found to be 1.179 times that of the average for all districts whereas, the cost of resources in the lowest cost district was only .944 times the average. In spite of these differences in costs, the effect on equality of educational opportunity was relatively small. The measure of equity of appropriations under the Adequate Program for Education in Georgia was lowered from 97.183 percent to 94.191 percent as a result of differences in the cost of resources -- a change of less than three percent. However, if the assumption is made that any effect should be considered, then the second question becomes a primary consideration. Can policy decisions be made which effectively compensate for the impact of resource cost differentials on equality of educational opportunity?

Sources of Cost Variations

If major sources of cost variations can be identified, then a beginning point for policy deliberations can be determined. The multivariate linear regression analysis technique was applied to the resource cost data to identify the major sources of variation in the resource cost indices (RCI) of the sample districts. Because of missing data, meaningful analysis could not be performed for all 29 cost factors considered in this study. Therefore, a decision was made to include only those cost factors for which data were available for 80 percent or more of the sample districts. Table 2 shows the correlation matrix for these data with the cost factors identified by the budget account numbers they were considered to represent (specifications for these resources are given in Chapter Four).

*Table 2 - Resource cost correlations

	RCI	054	068	069	070	071	074	077	079	110
RCI	1.0000	.1845	.7777	.7344	.9407	.5957	.9105	.4459	.6506	.5849
054	.1845	1.0000	.1728	-.1746	.0362	.2178	.0717	.3320	.0119	.1855
068	.7777	.1728	1.0000	.5478	.7265	.3910	.6863	.2998	.6738	.2074
069	.7344	-.1746	.5478	1.0000	.7458	.5645	.6715	.2226	.5454	.3506
070	.9407	.0362	.7265	.7458	1.0000	.5866	.9196	.3879	.6745	.6143
071	.5957	.2178	.3910	.5645	.5866	1.0000	.5374	.2766	.6499	.1331
074	.9105	.0717	.6863	.6715	.9196	.5374	1.0000	.4484	.6497	.5076
077	.4459	.3320	.2998	.2226	.3879	.2766	.4484	1.0000	.2958	.3222
079	.6506	.0119	.6738	.5454	.6745	.6499	.6497	.2958	1.0000	.0656
110	.5849	.1855	.2074	.3506	.6143	.1331	.5076	.3222	.0656	1.0000

*Resource cost variables are labeled with the budget account numbers represented by the resources specified in Chapter Four.

Table 2 - Resource cost correlations (continued)

	RCI	054	068	069	070	071	074	077	079	110
113	.4917	.2575	.2785	.2723	.5391	.2270	.4895	.1960	.2090	.7188
124	.5871	.2672	.5377	.2485	.3874	.1300	.4555	.1971	.2076	.3558
101	.4790	-.1024	.4338	.6201	.5204	.2156	.4437	.2002	.4183	.0941
105	.2587	.2905	.3261	.3729	.2327	-.0323	.2038	.1224	.1965	-.0726
058	.3334	.3616	.2950	.3748	.3362	.3573	.3210	-.0709	.2630	.1308
089	.2199	.0733	.2257	.3780	.2249	.2225	.1940	-.3434	.2171	-.0725
119	-.2522	-.2195	-.3250	.0362	-.3348	-.1978	-.2818	-.0424	-.3668	-.0038
115	-.4417	-.2203	-.2897	-.4664	-.4381	-.3319	-.4357	-.1583	-.3962	-.1882
131	.5078	.0285	.4893	.3276	.5279	.2052	.5409	.3109	.4226	.3569
130	-.5274	.8045	-.4039	-.5394	-.6775	-.3440	-.6612	-.4396	-.5863	-.4784

Table 2 - Resource cost correlations (continued)

	113	124	101	105	058	089	119	115	131	130
113	1.0000	.1840	.2155	-.1080	.1047	-.1177	-.1223	-.1000	.4593	-.3352
124	.1840	1.0000	.1627	.2662	.1674	.2453	-.0937	-.1671	.1524	-.1025
101	.2155	.1627	1.0000	.1842	.2313	.1764	-.0133	-.1501	.3719	-.3837
105	-.1080	.2662	.1842	1.0000	1.0000	1.0000	-.5501	-.5301	-.2040	-.0870
058	.1047	.1674	.2313	1.0000	1.0000	1.0000	-.4592	-.2512	-.2338	-.3301
089	-.1177	.2453	.1764	1.0000	1.0000	1.0000	.5104	-.2185	-.2165	-.0751
119	-.1223	-.0937	-.0133	-.5501	-.4592	-.5104	1.0000	.5256	.0689	.2813
115	-.1000	-.1671	-.1501	-.5301	-.2512	-.2185	.5256	1.0000	-.0244	.4051
131	.4593	.1524	.3719	-.2040	-.2338	-.2165	.0689	-.0244	1.0000	-.4610
130	-.3352	-.1025	-.3837	-.0870	-.3301	-.0751	.2813	.4051	-.4610	1.0000

When the selected cost factors were entered into regressions on RCIs, beginning teachers' salaries were found to be associated with approximately 88 percent of the variation in resource cost indices (see Table 3). Although the beginning salaries of custodians were found to have a statistically significant effect on RCI independent of beginning teachers' salaries, the strong relationship between the salaries of beginning teachers and RCI (r = .9407) suggests initial policy discussions would properly focus on differences in the salaries paid to beginning teachers.

Table 3 - Sources of RCI variation

Dependent Variable - Resource Cost Indices (RCI)

Variable Entered on Step One - Beginning Teacher Salary (Account 070)

Multiple R	.94070
R Square	.88493

Analysis of Variance	DF	Sum of Squares	Mean Square	F
Regression	1	.05022	.05022	123.04036
Residual	16	.00653	.00041	

Variables not in the equation:

Account	F	Account	F
054	3.6815207	124	15.3909940
068	2.9358125	101	.0197978
069	.3372262	105	.2208693
071	.3923682	058	.0435146
074	1.9733244	089	.0094430
077	1.0803272	119	.6008217
079	.0622316	155	.1420881
110	.0103777	131	.0229440
113	.0438847	130	3.6143189

Table 3 - Sources of RCI variation (continued)

Variable Entered on Step Two - Beginning Custodian Salary (Account 124)

Multiple R	.97119
R Square	.94320

Analysis of Variance	DF	Sum of Squares	Mean Square	F
Regression	2	.05352	.02676	124.54921
Residual	15	.00322	.00021	

*Variables not in the equation:

Account	F	Account	F
054	2.1872431	101	.0000362
068	.4784141	105	.0109987
069	1.1356512	058	.0155271
071	2.1169038	089	.3005560
074	.6869029	119	.8367622
077	1.5267170	115	.2846058
079	1.6988291	131	.2161598
110	.2343393	130	2.6573600
113	.0277490		

*No other variables can be entered at the .05 level of significance.

Situational Factors and Teacher Salary

Conceptual relations can be developed between several situational factors and the salaries paid to beginning teachers. Five tentative assumptions were advanced to provide a focus for discussions of relationships between teachers' salaries.

Assumption One - Differences in geographic location are associated with differences in beginning teachers' salaries.

Assumption Two - A positive relationship exists between the U. S. Census Bureau's 1973 estimates of per capita personal income and beginning teachers' salaries.

Assumption Three - A positive relationship exists between the equalized adjusted assessed property valuation per pupil in average daily attendance and beginning teachers' salaries.

Assumption Four - A positive relationship exists between the number of people per square mile and beginning teachers' salaries.

Assumption Five - A positive relationship exists between the percent of the population with a high school or higher level of education and beginning teachers' salaries.

Geography and Teacher Salary

When beginning teachers' salaries were examined in relation to geographic locations within the state, a pattern was easily identified. Most districts within Standard Metropolitan Statistical Areas, SMSAs, paid beginning teachers salaries above the median, while most districts outside of SMSAs paid salaries below the median (see Table 4). Six of the nine highest beginning salaries were in districts within the Atlanta SMSA (see Map 2. All SMSAs are heavily outlined). The range in teacher salary indices for these six districts was from a low of 1.0132 to a high of 1.1856.

Table 4 - Analysis of teacher salary and geography

	Districts Within SMSA	Districts Outside SMSA
Districts with salary above median	9	6
Districts with salary below median	2	13

Calculated X^2 value = 7.033

Critical value of X^2 at the .05 level of significance = 3.841

*Map 2 - Geography and teacher salary

*Beginning teacher salaries were rank ordered with the highest labled 1 and the lowest 26.

Circled numbers are for city systems.

A closer examination of beginning teachers' salaries within the Atlanta SMSA revealed interesting differences between the two pairs of city - county systems. In one pair, the teacher salary index for the city system was 1.1121 while, the county index was only 1.0793. In the other pair, the city - county differences were reversed. The county system's index was 1.1856 while, the city system's index for beginning teachers' salaries was only 1.1361. (In this case the city system's boundary extended beyond the county's boundary).

Although geographic differences in teachers' salaries were observed, inconsistencies in the relationships indicate geographic location alone is an inadequate consideration. More than 62 percent of the range in beginning teachers' salaries was found within the Atlanta SMSA. Furthermore, 20 percent of the range in beginning teachers' salaries was reported for a city system and a county system within the central area of the Atlanta SMSA. Apparently, factors other than being located within an SMSA were operating to influence beginning teachers' salaries.

Personal Income and Teacher Salary

When beginning teachers' salaries were examined in relation to the U. S. Census Bureau's 1973 estimates of per capita personal income a high positive correlation was found (see Table 5). Although not subjected to statistical analysis (see Table 6), Map 3 shows three of the five counties with the highest per capita personal income were within the Atlanta SMSA. These three county systems also paid higher salaries to beginning teachers than any of the other county systems included with the sample.

While the highest levels of per capita personal income were within SMSAs, the lowest levels of per capita personal income were outside of SMSAs. Of the 26 county systems included in the sample, the six lowest levels of per capita personal income are in counties which are not located within any SMSA. Per capita personal income appears to be one of the situational factors which may be associated with geographic differences in beginning teachers' salaries.

Property Wealth and Teacher Salary

Equalized adjusted assessed property valuation per pupil in average daily attendance had a low positive correlation with the salaries of beginning teachers ($r = .3532$). When assessed property valuation per pupil was examined in relation to geography a pattern similar to the relationship between per capita income and geography was observed. However, the pattern was not statistically significant (see Table 7). Five of the nine systems with the highest assessed valuations per pupil were within the Atlanta SMSA whereas,

Table 5 - Correlation matrix of situational factors

	Personal Income	Property Wealth	Population Density	Adult Education	Teacher Salary
Personal Income	1.00000	.22746	.62719	.73935	.73754
Property Wealth	.22746	1.00000	.41734	.38169	.35324
Population Density	.62719	.41734	1.00000	.30406	.57071
Adult Education	.73935	.38169	.30406	1.00000	.52632
Teacher Salary	.73754	.35324	.57071	.52632	1.00000

*Table 6 - Analysis of personal income and geography

	Districts Within SMSA	Districts Outside SMSA
Districts with income above median	6	7
Districts with income below median	3	10

*(This distribution does not meet the criteria for appropriate X^2 analysis. However, the direction of the distribution indicates per capita personal income tends to be associated with geographic location).

Table 7 - Analysis of property wealth and geography

	Districts Within SMSA	Districts Outside SMSA
Districts with property wealth above median	7	8
Districts with property wealth below median	4	11

Calculated $X^2 = 1.292$

Critical value of X^2 at the .05 level of significance = 3.841

*Map 3 - Income and geography

*Per capita personal incomes were rank ordered with the highest labled 1 and the lowest 26. (Data for cities were unavailable.)

the four lowest levels of property wealth were outside of any SMSA (see Map 4). In fact, only four of the 17 lowest levels of assessed valuations per pupil in average daily attendance were contained within SMSAs.

The relationship between property wealth and geography was not consistent. There were relatively high levels of assessed valuation outside of SMSAs and there were relatively low levels of property wealth per pupil within SMSAs. The positive correlation between assessed property valuations per pupil in average daily attendance and beginning teachers' salaries indicated there is reason to suspect property wealth had an effect on the salaries paid to teachers. However, the relationship between property wealth and geographic location was not strong enough statistically to indicate that assessed property valuations were a significant influence on the higher beginning teachers' salaries within the Standard Metropolitan Statistical Areas.

Population Density and Teacher Salary

Density of the populations residing within the sample school districts was found to have a moderate and positive correlation with the salaries of beginning teachers ($r = .5707$). As one would naturally suspect, population density within SMSAs was generally higher than outside of SMSAs (see Table 8).

When examined more closely, an observation was made that the population was not evenly distributed among the SMSAs or within SMSAs (see Map 5). For example, the two sample districts within the Chattanooga SMSA ranked 8 and 15 in density whereas, the sample districts within the Atlanta SMSA ranked 1, 2, 5, 7, 10, and 17. Even though beginning teachers' salaries had a moderate and positive correlation with population density, SMSAs were more densely populated, and higher teacher salaries were found within SMSAs; there is insufficient data to conclude higher teachers' salaries within SMSAs were the result of high population densities. Other situational factors may have been operating to affect the salaries of beginning teachers.

Adult Education and Teacher Salary

When the adult educational levels of populations residing within the sample school districts were examined in relation to the salaries paid to beginning teachers, a moderate and positive correlation was found ($r = .5263$). As Table 9 shows, districts within SMSAs were statistically more likely to have a percentage of the population with a high school or higher level of education which was above the median for the sample districts than school districts outside of SMSAs. There is reason to suspect the higher teachers'

*Map 4 - Property wealth and geography

*District assessed valuation per pupil in average daily attendance were rank ordered with the highest labled 1 and the lowest 31.

Circled numbers are for city systems.

Table 8 - Analysis of population density and geography

	Districts Within SMSA	Districts Outside SMSA
Districts with density above median	9	5
Districts with density below median	1	13

Calculated value of X^2 = 9.955

Critical value of X^2 at the .05 level of significance = 3.841

Table 9 - Analysis of adult education and geography

	Districts Within SMSA	Districts Outside SMSA
Districts with adult education above median	9	4
Districts with adult education below median	2	11

Calculated value of X^2 = 7.721

Critical value of X^2 at the .05 level of significance = 3.841

*Map 5 - Density and geography

*District populations per square mile were rank ordered with the district with the highest density labled 1 and the district with the lowest density labled 29.

Data for two city districts were unavailable.

salaries paid within SMSAs were, at least in part, affected by some factor or factors associated with adult education levels. However, as Map 6 shows, the range in adult education levels within SMSAs was from a rank of one through a rank of 21 for the 27 districts for which data were available.

Policy Directions

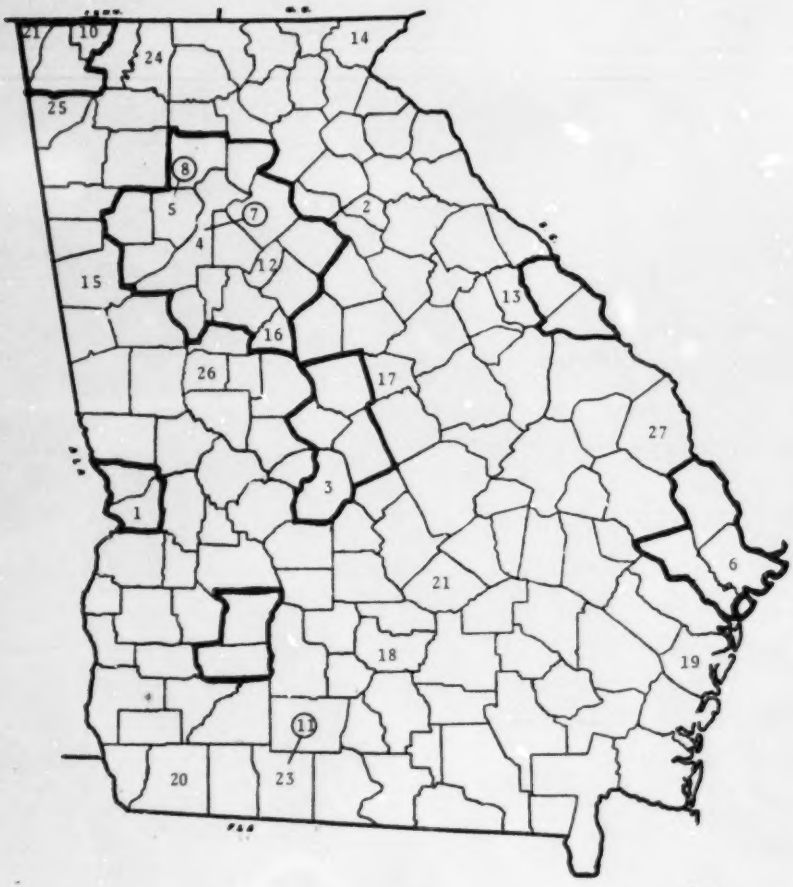
When situational factors were examined to identify relationships with beginning teachers' salaries general patterns were found. Districts within Standard Metropolitan Statistical Areas were more likely to pay salaries above the median than districts outside Standard Metropolitan Statistical Areas. Per capita personal income was found to have a correlation of .7375 with beginning teachers' salaries and tended to be associated with the geographic location of the district. Equalized adjusted assessed property valuation per pupil in average daily attendance had a correlation of .3532 with beginning teachers' salaries and tended to be associated with the location of the districts although, the association was not statistically significant. Population density was found to have a correlation of .5707 with beginning teachers' salaries and associated with geography. Percent of the population with a high school or higher level of education was associated with the geographic location of the district and found to have a correlation of .5263 with beginning teachers' salaries. The policy directions from these findings are not clear.

A major problem in determining a direction for policy is that the data are confounded. That is, there are differences in one situational factor that are associated with differences in other situational factors. For example, the correlation between density and per capita personal income is .6271; between property wealth and density, .4173; and between adult education and personal income, .7393.

One policy implication of these findings is that the variance in beginning teachers' salaries cannot be considered the result of the unique contribution of a single situational factor. Instead, differences in teachers' salaries may be the result of differences shared by combinations of situational factors. Statistical analysis cannot determine the effects of factors with shared variance, but techniques may be applied which will identify the more potent explanatory factors.

To determine the power of the various situational factors in predicting beginning teachers' salaries, multivariate linear regression analysis was performed. When the variable factors were entered into the linear regression, without the order of entry being predetermined, per capita personal income was found to be the most potent predictor of beginning teachers' salaries (see Table 10). Once per capita

*Map 6 - Adult education and geography



*Percent of the populations with high school or higher levels of education were rank ordered for school districts and the district with the highest percent labled 1 and the district with the lowest percent labled 27.

Data for four districts were unavailable.

Table 10 - Situational factors and teacher salary

Dependent Variable - Beginning Teacher Salary

Variable Entered on Step Number 1 - Per Capita Personal Income

Multiple R	.73754
R Square	.54396
Adjusted R Square	.52225
Standard Error	335.86503

Analysis of Variance	DF	Sum of Squares	Mean Square	F
Regression	1	2825634.55798	2825634.55798	25.04877
Residual	21	2368911.71729	112805.31987	

*Variables not in the Equation:

	Beta in	Partial	f
Assessed Property Valuation per Pupil in ADA	0.19560	0.28206	1.729
Population Density	0.17825	0.20559	0.883
Adult Education	-0.04186	-0.04173	0.035

*No other variables can be entered at the .05 level of significance.

personal income was entered, none of the other situational factors added any statistically significant contributions to the prediction of the salaries paid to beginning teachers. This means no other situational factor considered in the analysis made a statistically significant contribution that was independent of per capita personal income. This does not mean other factors do not influence the beginning salary of teachers. But, when the other situational factors were paired with per capita personal income in regressions on beginning teachers' salaries, per capita personal income made a statistically significant contribution to the prediction of beginning teachers' salaries even when the other factors were entered first (see Tables 11 through 13). Per capita personal income added between 23.7 and 45.5 percent to the amount of variance in beginning teachers' salaries explained after the other situational factors were entered into the regressions.

The relatively large independent contribution of per capita personal income to the explanation of differences in beginning teachers' salaries indicates per capita personal income would be an appropriate focus for initial discussions concerning amendments to the state plan to compensate for differences in the salaries of beginning teachers.

At least two alternative rationales can be developed to support a causal relationship between per capita personal income and the salaries of beginning teachers. The first assumes per capita personal income is a reflection of cost of living and salaries of teachers are affected by these differences in the costs of living. An alternative rationale is that per capita personal income is an indicator of the willingness and ability of local populations to pay teachers.

If differences in beginning teachers' salaries are affected by differences in the cost of comparable standards of living associated with per capita personal income, then efforts to amend the state plan to compensate for differences in the salaries of beginning teachers may be justified. However, if differences in beginning teachers' salaries are affected primarily by differences in the willingness and ability of local populations to pay higher salaries to teachers, then amending the state plan to compensate for differences in the salaries of beginning teachers would be difficult to justify.

Until a rationale for a positive relationship between per capita personal income and beginning teachers' salaries is supported by empirical evidence, amending the state plan to compensate for differences in the salaries of teachers would be premature. If convincing evidence can be produced to indicate differences in beginning teachers' salaries are clearly influenced by differences in the cost of comparable standards of living, then the primary consideration still remaining would be: Can policy decisions be made which effec-

Table 11 - Property wealth and income on teacher salary

Dependent Variable - Beginning Teacher Salary

Variable Entered on Step One - Property Wealth

Multiple R .35324

R Square .12478

Analysis of Variance	DF	Sum of Squares	Mean Square	F
Regression	1	648185.65943	648185.65943	*2.99402
Residual	21			

*Significant only at the .10 level

Variable not in the equation: Per Capita Income (F = 21.701)

Variable Entered on Step Two - Per Capita Income

Multiple R .76174

R Square .58024

Analysis of Variance	DF	Sum of Squares	Mean Square	F
Regression	2	3014097.36718	1507048.68359	13.82329
Residual	20	2180448.90809	109022.44540	

Table 12 - Density and income on teacher salary

Dependent Variable - Beginning Teacher Salary

Variable Entered on Step One - Population Density

Multiple R .57071

R Square .32571

Analysis of Variance	DF	Sum of Squares	Mean Square	F
Regression	1	1691904.32102	1691904.32102	10.14377
Residual	21	3502641.95426	166792.47401	

Variable not in the equation: Per Capita Income (F = 10.876)

Variable Entered on Step Two - Per Capita Income

Multiple R .75049

R Square .56324

Analysis of Variance	DF	Sum of Squares	Mean Square	F
Regression	2	2925757.29868	1462878.64934	12.89568
Residual	20	2268788.97660	113439.44883	

Table 13 - Adult education and income on teacher salary

Dependent Variable - Beginning Teacher Salary

Variable Entered on Step One - Adult Education

Multiple R .52632

R Square .27701

Analysis of Variance	DF	Sum of Squares	Mean Square	F
Regression	1	1438956.46472	1438956.46472	8.04616
Residual	21	3755589.81056	178837.61003	

Vabiable not in the equation: Per Capita Income (F = 11.762)

Variable Entered on Step Two - Per Capita Income

Multiple R .73808

R Square .54476

Analysis of Variance	DF	Sum of Squares	Mean Square	F
Regression	2	2829760.29154	1414880.14577	11.96624
Residual	20	2364785.98374	118239.29919	

tively compensate for the impact of resource cost differentials on equality of educational opportunity?

Summary

Substantial differences were found to exist in the cumulative resource cost indices for the 31 sample districts. However, when these differences were examined in relation to the equity of appropriations under the Adequate Program for Education in Georgia, resource cost differentials were found to have a relatively minor effect on the measure of appropriations equity. Differences in the cost of resources lowered the equity of appropriations under the state plan by less than three percent.

Beginning teachers' salaries were found to be associated with approximately 88 percent of the variance in resource cost indices. When relationships between several situational factors and beginning teachers' salaries were examined, only one factor was found to have a statistically significant, independent effect in the prediction of the salaries of beginning teachers. Per capita personal income was the most powerful of the situational factors considered in predicting beginning teacher's salaries.

Two alternative rationales for positive relationships between per capita personal income and beginning teachers' salaries were presented. Empirical evidence is not available to support either rationale. Until evidence can be provided to clearly support a rationale for causal relationships between per capita personal income and teachers' salaries, caution is advisable. Adjusting the state plan to compensate for differences in the salaries paid to teachers at this time would be premature.